MARITIME HERITAGE MINNESOTA

Ann Merriman
Christopher Olson

Lake Minnetonka Nautical Archaeology 8 Project

Acknowledgments

Maritime Heritage Minnesota (MHM) thanks the People of Minnesota for their support of the Minnesota Historical and Cultural Heritage Grant program of the Arts and Cultural Heritage Fund of the Clean Water, Land and Legacy Amendment; without the MHCH Grant MHM received to conduct this project, the work would not have been undertaken. MHM would also like to acknowledge the Grants Office of the Minnesota Historical Society for their expertise. We thank Bruce Koenen and Amanda Gronhovd of the Office of the State Archaeologist for their efforts. MHM thanks John Nordby of the Department of Natural Resources for his time and patience with our requests for information. MHM owes the Mille Lacs Band of Ojibwe great thanks for the generous equipment grant that allowed for MHM to purchase a new sonar unit. MHM thanks friend and supporter Mike Brill for his input, support, and suggestions, and Clay Tallant, Andreas Jordahl Rhude, and Scott McGinnis for their input. MHM could not have completed this project without the in-kind support of volunteer divers Josh Knutson, Kelly Nehowig, Ed Nelson, and Mark Slick. MHM thanks these talented and ethical men for their time and skill. We also thank our volunteer Betty Lloyd for her constant support. This project could not have been completed in a timely fashion without the consideration of MHM's Chair and Commodore Michael F. Kramer for the on-lake storage of MHM's boat. Lastly, MHM thanks our Board of Trustees Mike, Deb Handschin, and Steve Hack for their continued support.

Underwater Archaeologist
Christopher Olson

Underwater Archaeologist
Ann Merriman

Volunteer Diver
Kelly Nehowig

Volunteer Diver
Mark Slick

Volunteer Diver
Ed Nelson

Volunteer Diver
Josh Knutson

Trustee
Steve Hack

Chair
Mike Kramer

Mascots & Computing Cats
Weebles Cat & Rodney Cat

Volunteer
Betty Lloyd

Volunteer Dive Crew
Ann Nehowig

Trustee
Deb Handschin

"ACHF grants have allowed a small St. Paul-based nonprofit, Maritime Heritage Minnesota (MHM), to re-establish the discipline of underwater archaeology in Minnesota. Without this support, MHM could not have conducted its groundbreaking nautical archeological and maritime historical research."

~Steve Elliott, Former Minnesota Historical Society CEO and Director, January 2015

Introduction

Wrecks and the artifacts associated with them tell a story. Removing or otherwise disturbing artifacts, treating them as commodities that can be sold, obliterates that story. Nautical archaeological and maritime sites are finite, and are significant submerged cultural resources. Nautical, maritime, underwater, maritime terrestrial – Maritime Heritage Minnesota's (MHM) deals with all of these types of sites throughout the State of Minnesota. MHM's Mission is to document, conserve, preserve, and when necessary, excavate these finite cultural resources where the welfare of the artifact is paramount. MHM is concerned with protecting our underwater and maritime sites – our shared Maritime History – for their own benefit in order for all Minnesotans to gain the knowledge that can be obtained through their study. MHM's study of wrecks does not include the removal of artifacts or damaging the sites in any way. MHM does not raise wrecks or 'hunt' for 'treasure'. Submerged archaeological sites in Minnesota are subject to the same State statues as terrestrial sites: the Minnesota Field Archaeology Act (1963), Minnesota Historic Sites Act (1965), the Minnesota Historic District Act (1971), and the Minnesota Private Cemeteries Act (1976) if human remains are associated with a submerged site. Further, the case of *State v. Bollenbach* (1954) and the Federal Abandoned Shipwrecks Act of 1987 provide additional jurisdictional considerations when determining State oversight and "ownership" of resources defined by law as archaeological sites (Marken, Ollendorf, Nunnally, and Anfinson 1997, 3-4). Therefore, just like terrestrial archaeologists working for the State or with contract firms, underwater archaeologists are required to have the necessary education, appropriate credentials, and hold valid licenses from the Office of the State Archaeologist (OSA).

MHM completed two side and down-imaging sonar surveys of Lake Minnetonka in September-November 2011 and May-June 2012 – the Lake Minnetonka Surveys 1 and 2 Projects (LMS-1, LMS-2). Prior to MHM's two comprehensive surveys, there was one recognized nautical archaeological site on the lake bottom and another five wrecks were known. MHM completed the Lake Minnetonka Nautical Archaeology 1-7 Projects (LMNA-1, LMNA-2, LMNA-3, LMNA-4, LMNA-5, LMNA-6, LMNA-7) between 2012-2017. At the beginning of the Lake Minnetonka Nautical Archeology 8 Project (LMNA-8) in early June 2018, there were 66 known wrecks (including the Lake Minnetonka North Arm Dugout Canoe removed from the lake in 1934), 29 maritime sites/cultural resources, 1 doodlebug, 6 cars, 1 truck, 1 snowmobile, and 27 'other' objects identified on the bottom of Lake Minnetonka.

Preface

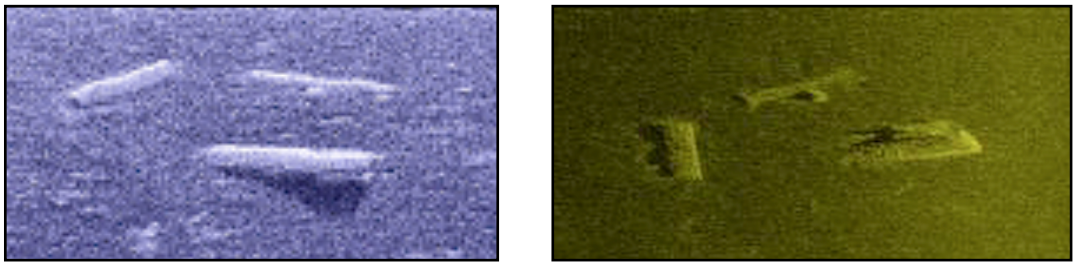
During the Lake Minnetonka Nautical Archaeology 8 Project (LMNA-8), MHM investigated 1 previously documented wreck in order to answer specific questions about her nature, along with 27 unknown anomalies. The fieldwork was conducted from early June to early September 2018.

Results of the Lake Minnetonka Nautical Archaeology 8 Project

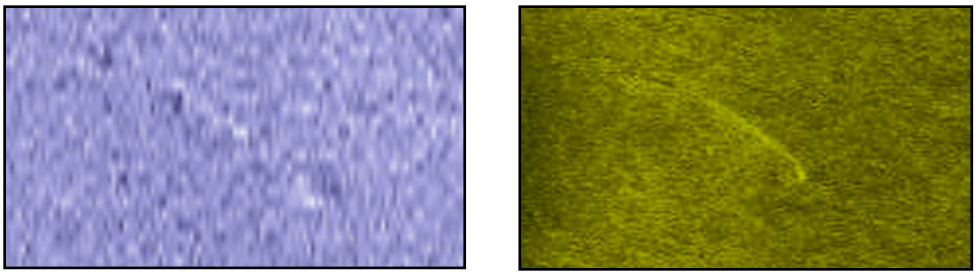
Research Design

The goals of the LMNA-8 Project: 1. answer questions about one previously identified wreck; 2. determine the nature of specific anomalies recognized during sonar surveys; 3. conduct additional side and down imaging sonar survey on targeted anomalies and areas of the lake using updated sonar equipment; and 4. continuation of MHM's sediment build-up study. In order to increase the collective maritime archaeological and historical knowledge of Minnesotans. MHM determined which anomalies would be investigated from an analysis of sonar data - recorded in 2011, 2012, 2017, and 2018 - that suggested they were submerged cultural resources. Targeted side and down-imaging sonar re-scanning of particular anomalies in 2017 and 2018 was conducted with newly acquired improved sonar equipment. Each anomaly was assigned a number upon its recognition as a possible site. Clarity of sonar data provided by the new equipment allowed for the identification of several anomalies without conducting reconnaissance using SCUBA. One anomaly, A704 was identified as a tree and 14 others (A191, A214, A399, A400, A459, A470, A508, A580, A611, A673, A696, A701, A702, A703) were determined to be false targets (bottom contours or vegetation). Further, MHM re-scanned known wrecks and maritime sites to acquire more detailed sonar images of them. The results of this re-scanning, with the old images on the left and the new sonar on the right:

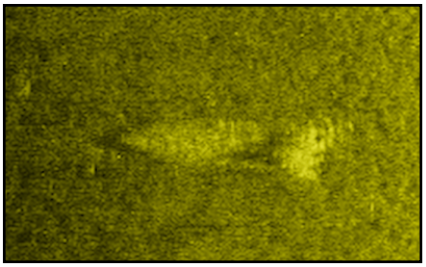
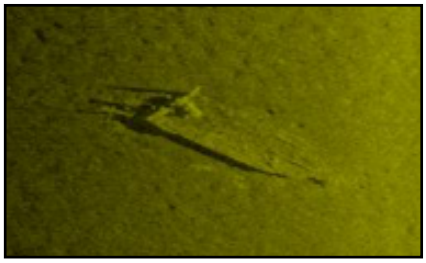
Marine Launch Boilers Site - 21-HE-421



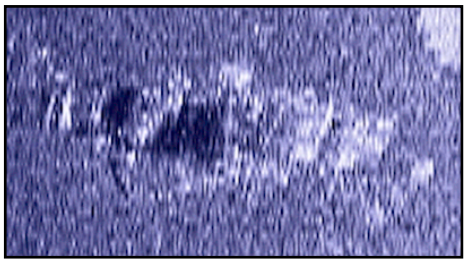
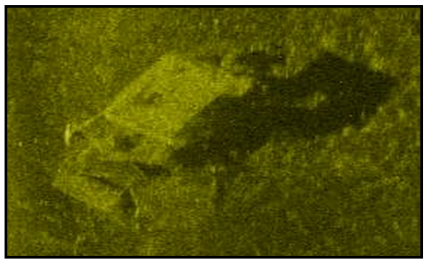
St. Louis Bay Wreck - 21-HE-422



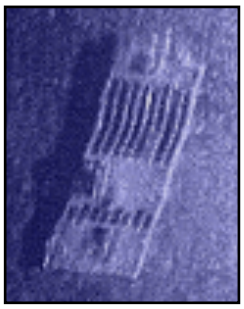
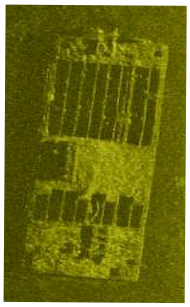
Burned Fiberglass Boat Wreck Site, 21-HE-504

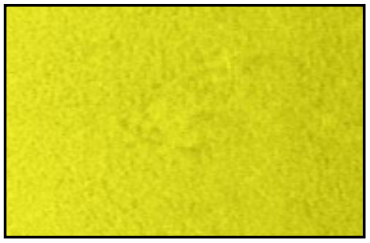
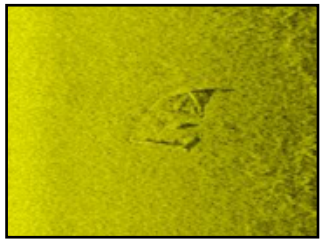
Terra-Marina Amphibious Houseboat Wreck - Anomaly 4

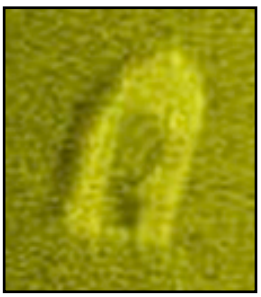
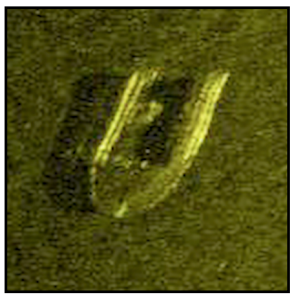
St. Albans Bay Wreck - 21-HE-400

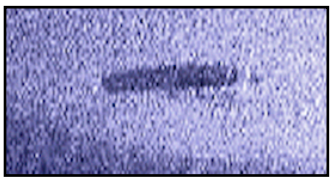
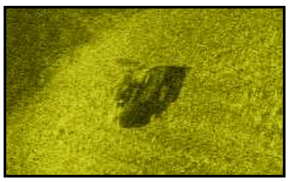
Hydroplane Wreck 2 - 21-HE-502

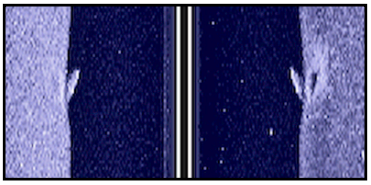
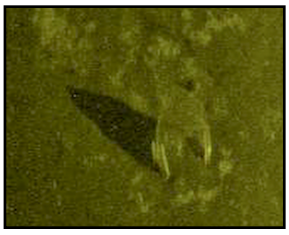
Jet Stream Wreck - Anomaly 84

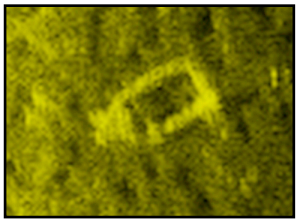
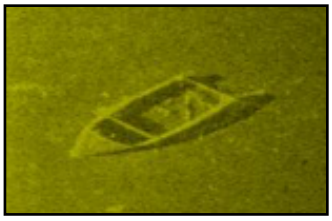
Wooden Trunk Cabin Cruiser Wreck - 21-HE-446

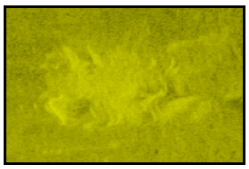
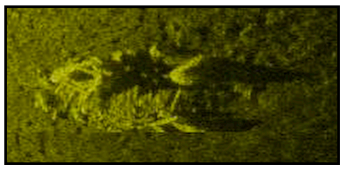
Fiberglass Drag Boat Wreck - Anomaly 23

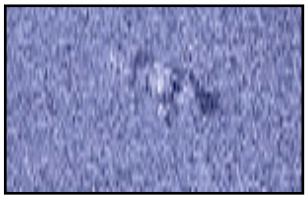
Herter's Model Hudson Bay Wreck - Anomaly 601

Rubble Pile - Lafayette Hotel or Club - Anomaly 8.1c

Alumacraft Center Console Model R Wreck - 21-HE-448

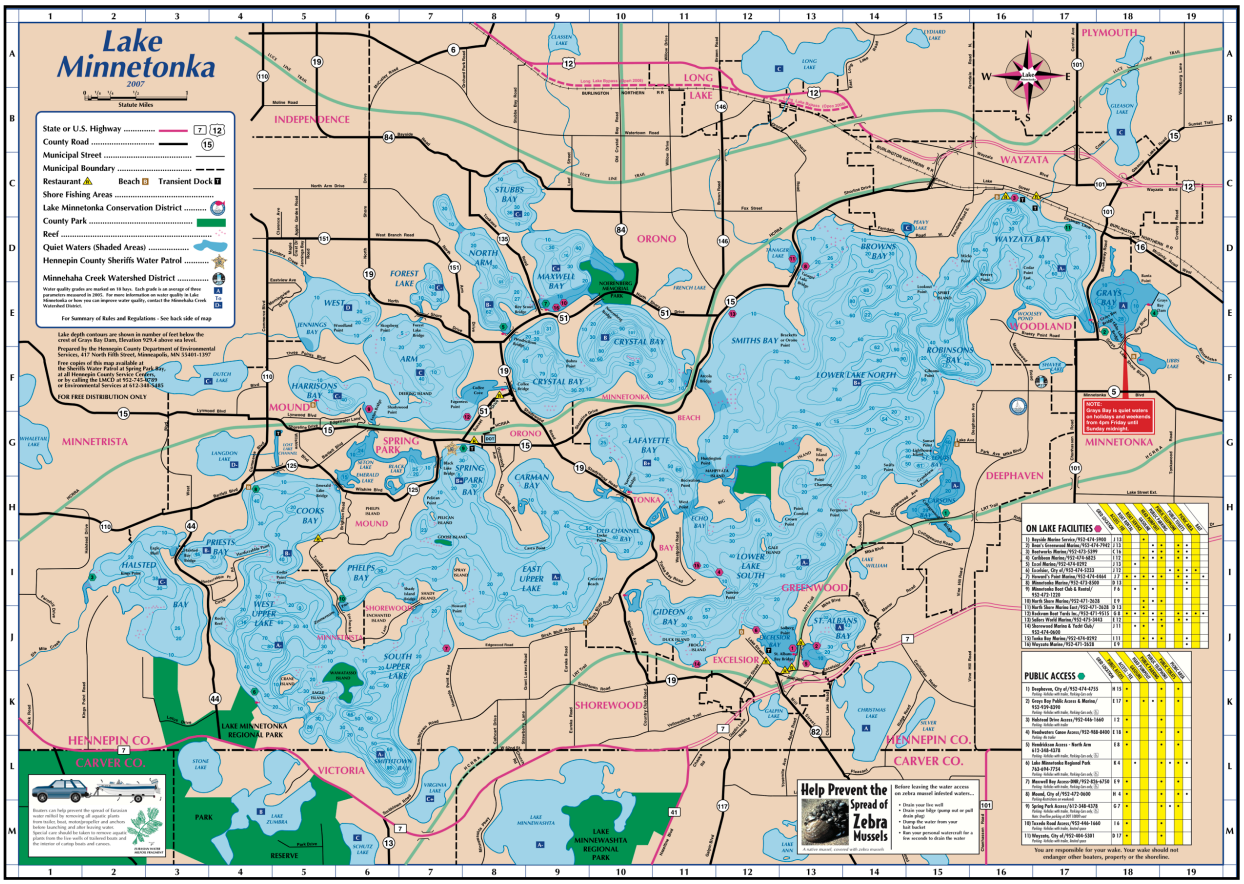



The 27 unknown anomalies examined using SCUBA during the LMNA-8 Project were A585a, A660, A680, A688, A695, A697, A708, A715, A717, A718, A719, A720, A721, A722, A723, A725, A726, A729, A730, A731, A736, A737, A738, A745, A746, A750, A751. The 1 known wreck re-visited during this project was A264, formerly known as the Small Aluminum Wreck Site and now known as the Shell Lake Portager Wreck (Anomaly 264, 21-HE-508). Further, the Wooden Motor Boat Wreck 3 (Anomaly 695, 21-HE-506) was first identified by MHM volunteer Kelly Nehowig in November 2017. Using data accumulated from the fieldwork as a starting point, MHM conducted

research to place newly recognized nautical archaeological sites and anomalies into their historical contexts. Minnesota Archaeological Site Forms were filed with the OSA when appropriate.

Methodology

The methodology used to identify and rudimentarily document underwater archaeological anomalies is straightforward. MHM used the GPS coordinates of a wreck or an anomaly - and in the case of LMNA-8 the sonar footage was newly recorded - to drop a weighted diver down buoy near the target. The dive boat anchored a short distance away from the buoy and divers geared up for the dive. At any given time, there were between two and four divers underwater. If the buoy anchor weight landed near and sometimes on the anomaly or wreck, no search for the target was conducted. However, for a variety of reasons, a brief search for the target was conducted until it was located or it was determined that the anomaly was a false sonar return. If a cultural or natural resource was located, the divers photographed and recorded video of the site or object, logged its basic measurements, examined any obvious attributes, and measured sediment build-up (if appropriate).



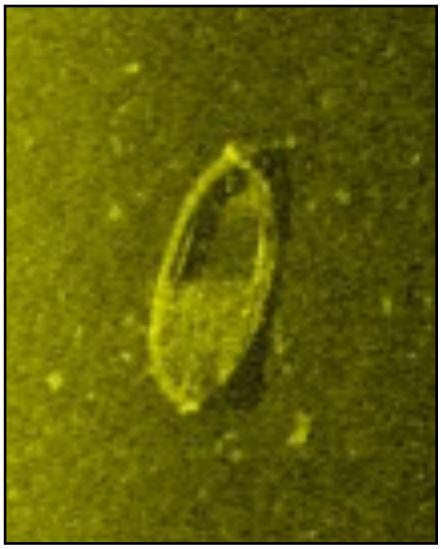
Lake Minnetonka (Lake Minnetonka Conservation District).

Results

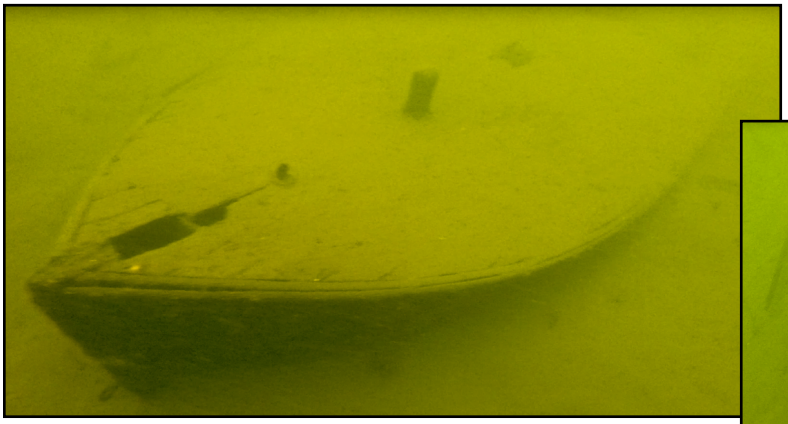
After the completion of the LMNA-8 Project fieldwork in early September 2018, there are now 76 identified wrecks on the bottom of Lake Minnetonka or that were once on the bottom, including a Woodland Culture dugout canoe removed from the lake in 1934. Of these wrecks, 49 of them have 48 Minnesota archaeological site numbers; 2 wrecks are features of one site. Further, 4 other types of maritime sites have archaeological site numbers and there are 32 maritime sites or objects without numbers. Additionally, 28 'other' objects have been identified that do not have site numbers, among them 12 vehicles that include 4 snowmobiles, 1 truck, and 7 cars. During the LMNA-8 Project specifically – of the 27 unknown anomalies and 1 known wreck investigated – MHM and its volunteers accumulated important data about the wreck and confirmed the existence of 10 new wrecks, 6 new submerged maritime sites, 7 ‘other’ sites/objects that includes 3 snowmobiles, 2 trees, 2 big rocks, and 0 false sonar returns.

Half-Decked Barge Wreck Site, 21-HE-505 (Anomaly 697)

MHM recorded a sonar image of Anomaly 697, the wooden Half-Decked Barge Wreck, during the LMS-2 Project in May 2012. However, due to the location of the anomaly on the far side of a raised portion of the lake bottom between A697 and the source of the sonar beam - the sonar image was ambiguous. Acting on information from local informant and MHM supporter Mike Brill, MHM re-scanned the area and Anomaly 697 in June 2018 and produced detailed sonar data with the new survey equipment. The Half-Decked Barge Wreck is 21.00 feet long and 6.70 feet in the beam; the depth of hold is more than 3.00 feet deep, and the hull is significantly filled with silt. The barge is ‘double-ended’, meaning both ends are pointed, so this attribute cannot be used to determine her bow and stern. Anomaly 697’s ends have sturdy, thick, and well-



A sonar image of the Half-Decked Barge Wreck - the stern is to the top of the image (MHM).



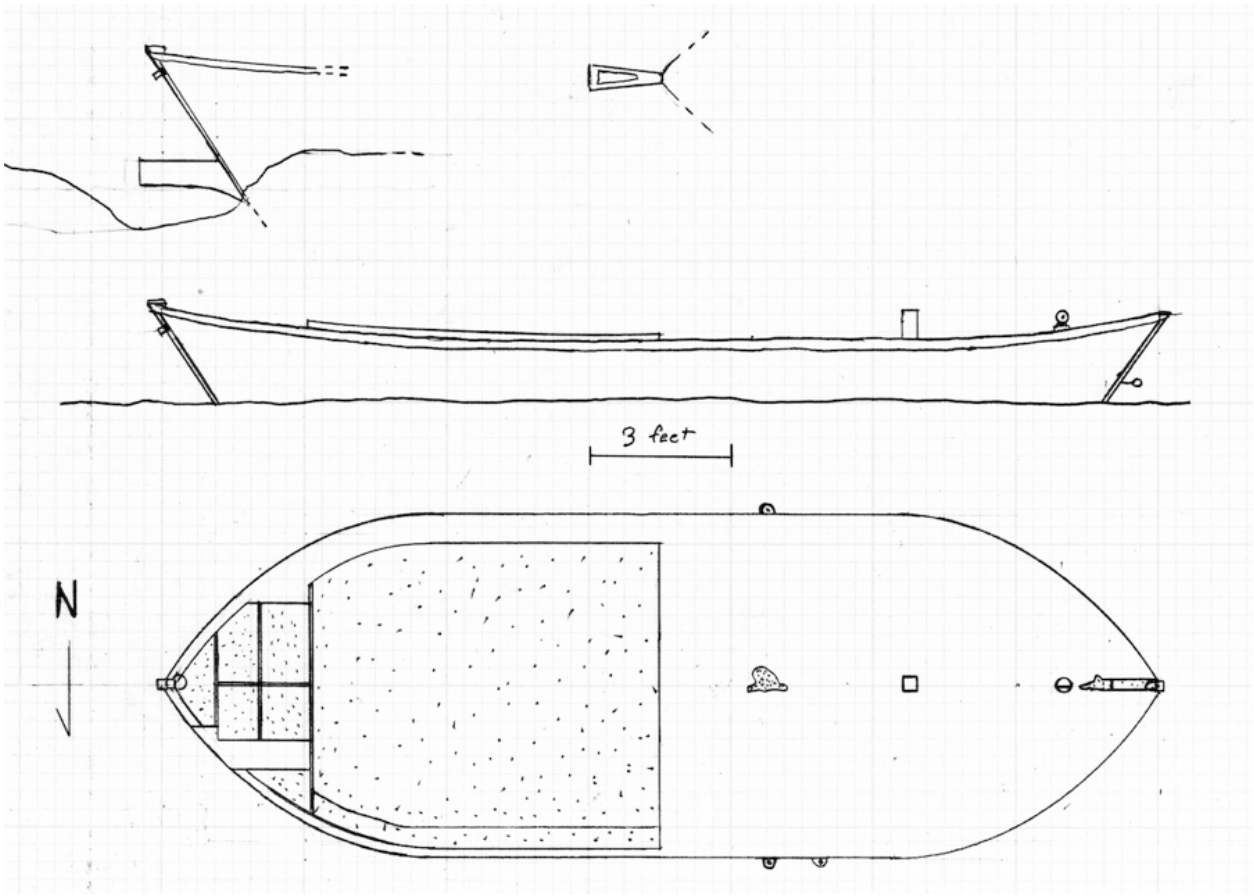
The wreck’s bow (Mark Slick).

built posts; one of these posts has a gudgeon strap for the pintle of a rudder stock. Lower on the sternpost a metal trapezoidal attachment that would receive the heel pintle of the rudder stock is found. MHM contends the metal attachment was designed by the barge's owner and operators to assist in supporting a detachable outboard rudder that would only be utilized when necessary for efficient steering. Therefore, the wreck's stern is the end with the gudgeon strap, heel pintle support, and smaller deck, although the barge would travel easily through Lake Minnetonka with her bow or stern forward when towed by a tug or other vessel.

The wreck's stern, gudgeon strap on the sternpost, and inner hull loop (Mark Slick, Kelly Nehowig).

The stempost has a metal towing/mooring line ring attached to it near the waterline. Inside the hull below the deck a round pad eye is attached to the stempost along with another larger metal ring. At the stern, a corresponding round pad eye and ring are attached to the sternpost at the deck level; this metal assemblage also has a small platform extending into the hull. MHM contends this flat metal piece may be a footrest for the crew manning the rudder. The foredeck also had a large pad eye attached at the midline and 2 small pad eyes are secured to the starboard gunwale with 1 corresponding surviving pad eye on port just forward of amidships. This combination of large and small strong metal rings on and below the deck served as attachment points for: 1. hogging chains when necessary to prevent sagging when carrying heavy loads; 2. mooring and towing lines; and 3. tie-down lines to secure deck cargo. The large foredeck and small aft deck are flush with the gunwales amidships - the cap rail rises above the decks at both ends and a rub rail is attached to it. The starboard rubrail has sprung from its place amidships but is still attached fore and aft; the rail did not break but separated at a scarf, indicating this attribute was constructed of more than one piece of wood. The starboard gunwale amidships is damaged and the dislodged wood is lying in the hull. A cockpit combing survives on the port side but is dislodged on starboard. A bollard protrudes from the foredeck and the decks are longitudinally planked; most of the aft deck planks are missing. Because of the missing deck planks and a damaged area at the bow, athwartships and longitudinal deck beams are seen. Silt has shifted away from the hull in a few places, exposing the white-painted hull.

The vessel is held together with iron nails, both cut with square heads and wire with round heads. Cut square-head nails were in common use in the US by 1820 until around 1893. Wire round head nails were widely used by 189 (Melchert ND; Wells 1998, 92). The use of this fastener combination suggests the Half-Decked Barge Wreck was constructed between 1879 and 1893. MHM suggests an 1879-1885 construction date based on the use of wooden barges by lake settlers busy de-foresting the area, producing cord wood (maple, oak, bass) for sale to James J. Hill and his business partners beginning in 1876 (Merriman and Olson 2015, 11-13). The wreck's design suggests she could be used to haul bulk commodities like stone for rip-rapping, dredged mud for navigation improvements and land reclamation, and gravel for anti-erosion efforts on the shoreline. The existence of the numerous metal fittings that could be used for hogging chains and tow lines points to the transportation of heavy cargo; the large and sturdy stem and sternpost design and construction supports this hypothesis. Further, dry, lighter commodities could be carried on the foredeck in significant quantities. MHM suggests a site disposition date of between 1900-1910 due to the significant amount of sediment building up in her hull - over 3 feet - in an area where the water does not drop its sediments at a high rate. Further, the 1900-1910 date range allows for a working life of 21-31 years for the Half-Decked Barge Wreck, a reasonable amount of time for a vessel of her type. MHM submitted an archaeological site form for the wreck to the OSA in mid-September 2018 and received her site number, 21-HE-505, at that time.



A sketch of the Half-Decked Barge Wreck (Christopher Olson).

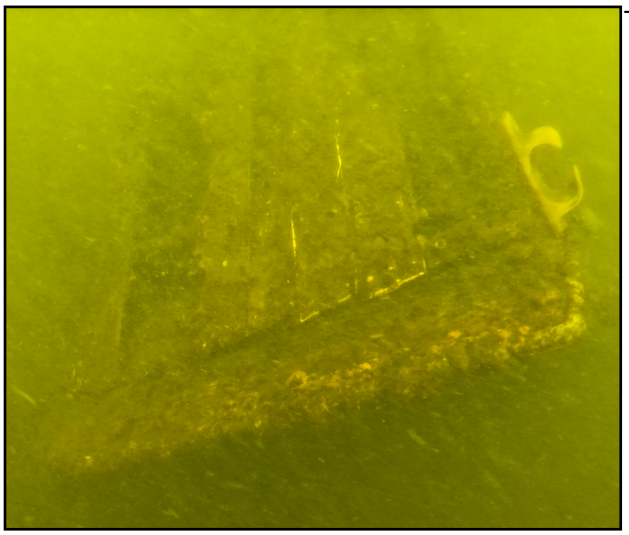
Theta Wreck Site, 21-HE-514 (Anomaly 745)

MHM recorded a sonar image of Anomaly 745, a gasoline launch wreck, during the LMS-2 Project in May 2012. However, due to the location of the anomaly in a field of rocks on a raised portion of the lake bottom, the wreck's sonar image suggested she was a large rock among many. Acting on information from local informant and MHM supporter Mike Brill, MHM re-scanned the area in June 2018 and produced detailed sonar data with the new survey equipment. The launch is named *Theta* - her brass cut nameplate is attached to the port and starboard bows with brass slot-headed wood screws. *Theta* is 21.50 feet long, 6.20 feet in the beam, and the depth of hold is 3.00 feet. The wreck is lying on her starboard side; when she sank, her keel was unable to sink into the lake bottom because she landed on hard gravel and sand. *Theta* has a heavy, sturdy stempost rabbited to the keel. Her bow is pointed and her broad foredeck is comprised of longitudinal deck planks with a binding strake - a raised plank - on the midline. The foredeck supports 2 chocks, a round flag pole base, a finely-crafted cleat, and the wreck's gas cap. Some of the deck planks are damaged. On both port and starboard forward, the gunwale - intact throughout the wreck - has round attachment points for railings; 1 railing lies next to the wreck off the starboard bow and another lies off the stern. A raised cowling survives on the port side of the wreck, formed around the cockpit; an oarlock survives on the starboard side cowling aft of the engine.

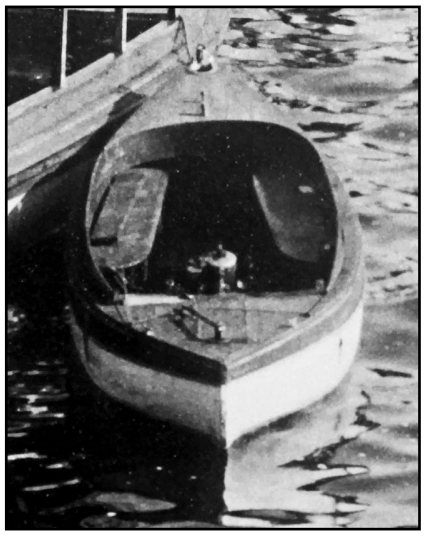
The bow of *Theta* and her bow cleat (Kelly Nehowig).

The port bow of *Theta* and her gas tank under the forward deck (MHM).

Theta has a ‘compromise’ stern, also known as a ‘canoe stern’ that is pointed at deck level and widens out below, allowing for a stable, full hull at the waterline. This design allows for higher speeds and by the early 1900s, personal and commercial excursion cruisers were constructed with compromise sterns. Compromise sterns were known to move through the water with little resistance, handled well in rough water without taking on water in a following sea, and moved well in reverse (Nock 1907, 16). Her thick sternpost is comprised of a wide beam and a thinner beam; it is rabbited into the keel. *Theta* has 1 metal chock remaining on the port side deck at the stern and a socket for a flagpole is located on the centerline, attached to the binding strake. The stern deck is comprised of longitudinal planks on either side of the binding strake; some planks are damaged. A detached railing lies beyond the wreck’s stern, possibly torn off the wreck by an anchor. The port side outer hull planks are nearly intact at the bow and there are gaps in the planking amidships and aft. Frames can be seen in places on the port side, with ceiling planking attached to the inner hull.



The compromise stern of *Theta* (Mark Slick).

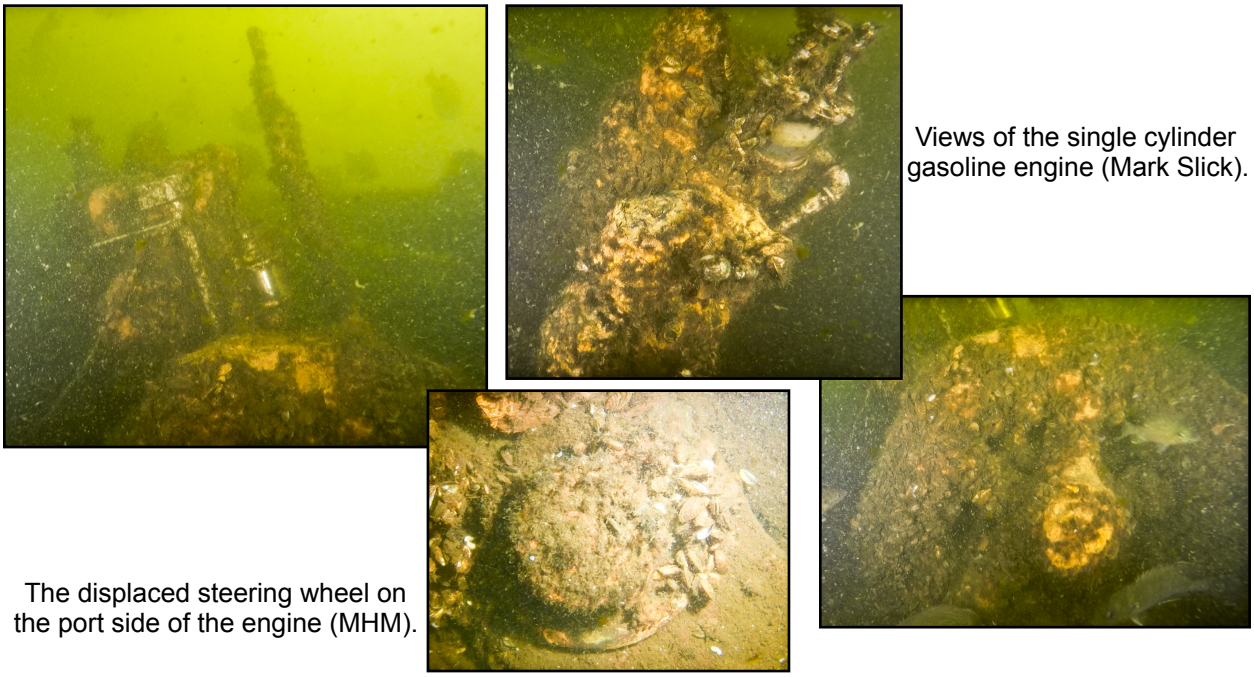


A small Lake Minnetonka gasoline launch with a compromise stern around 1908 (courtesy of Scott McGinnis)

Due to the tilted to starboard position of the wreck, the inner hull fittings have become detached - but have survived. When intact, passenger benches were attached on both sides of the vessel; the benches are present, loose in the hull. The square gas tank remains under the foredeck with its aft side and top destroyed by rust. Under the aft deck, the ceiling planking is intact and 1 longitudinal stringer is seen. The steering wheel was originally attached to the inner hull on the port side aft of amidships; it now lies loose in the hull. Next to the unattached steering wheel, the 1 cylinder 2-cycle flywheel engine remains attached to the bottom of the hull by its mounts. The rotary (cam) timer switch and its spark timing adjustment handle (part of the ignition system), is located behind the flywheel.[1] A drip oiler is next to the rotary timer switch and a second drip oiler is located on the aft portion of the cylinder head. At the center of the cylinder head, a small quick opening valve at the base of the now-missing primer cup, survives. Behind it, the engine’s single spark plug is found. A plunger-style water pump is attached to the back of the cylinder; it moves water into the waterjacket through the intake pipe and pumps it out the exhaust pipe to cool the engine. The intake pipe has a valve to shut down the water flow to the water jacket; the input pipe has a quick opening

[1]At this time, MHM cannot determine if the ignition system has a vibrating coil/magneto or a battery/magneto for power creation.

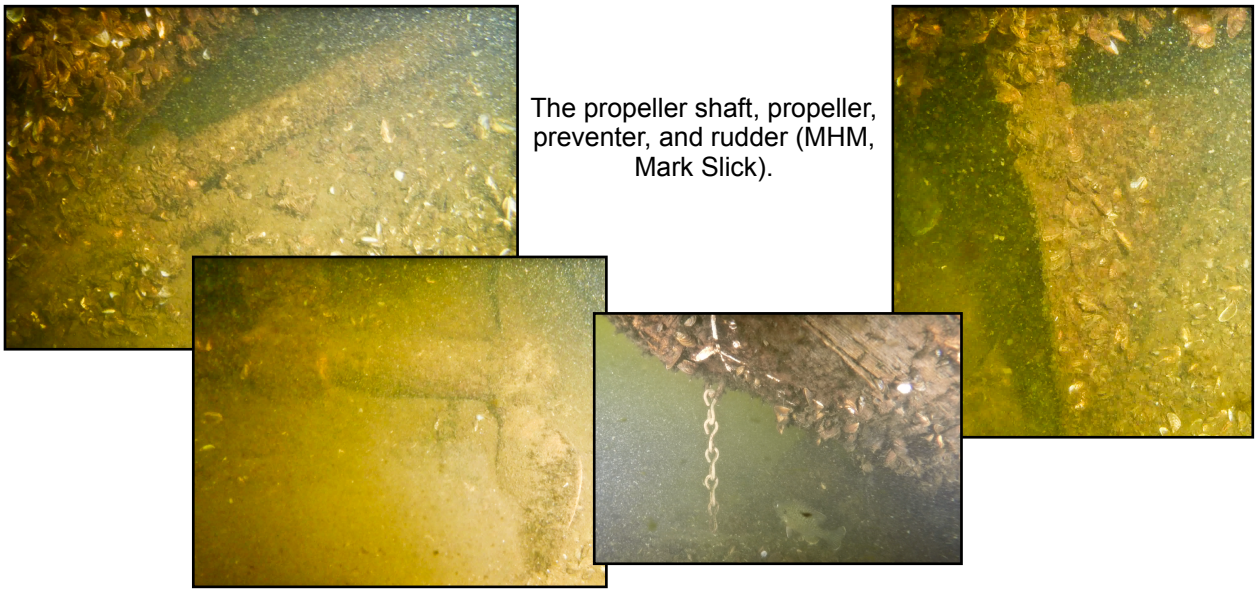
valve to control the water flow. The engine is a direct drive model where the crankshaft (inside the crankcase) is connected directly to the propeller shaft. The reversing lever, located on the port side of the engine, adjusted the pitch of the propeller blade that allowed the boat to go in reverse without putting the engine in reverse. In consideration of the engine size, MHM contends its was rated at 5 horse power or less. Two white cylindrical objects are lying in the hull aft of the engine; MHM surmises they are filters.



Views of the single cylinder gasoline engine (Mark Slick).

The displaced steering wheel on the port side of the engine (MHM).

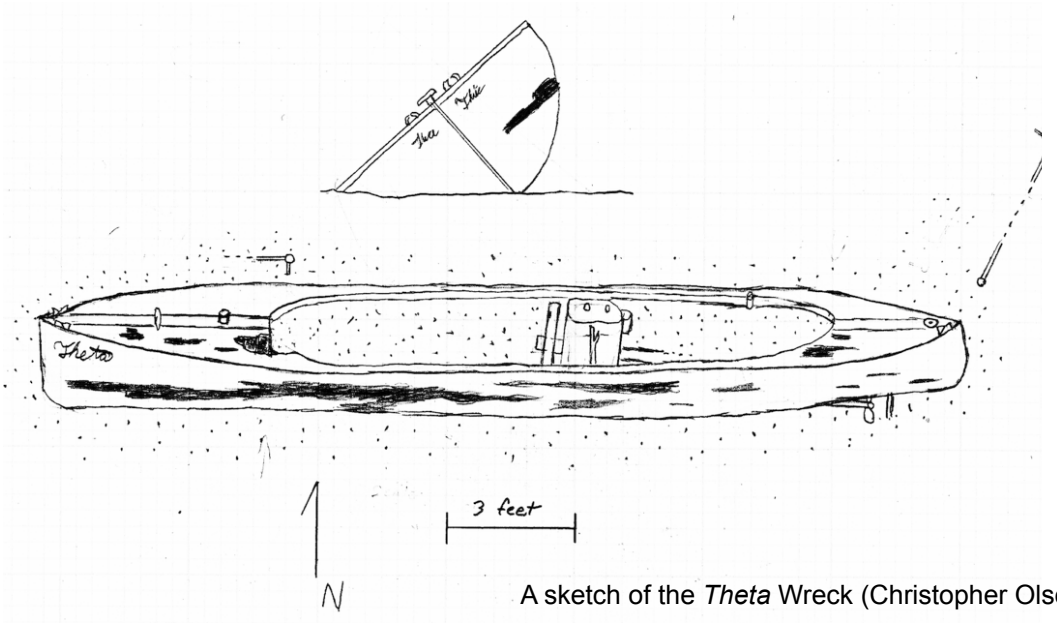
Since the wreck is listing to starboard on hard gravel, the propeller shaft, two-blade propeller, and rudder are visible when approaching *Theta* from the port side. A metal strut protruding from the vessel's bottom acted as a stabilizer for the propeller shaft. The propeller blade still shifts, an indication that when the reversing level was engaged, its pitch would change to propel the boat backwards. The rudder stock protrudes from the bottom of the wreck and disappears into the gravel. MHM contends the pintle of the



The propeller shaft, propeller, preventer, and rudder (MHM, Mark Slick).

rudder stock is held in place by a heel that cannot be seen at the present time. The heel is a longitudinal metal bar that is attached to the strut that holds the proper shaft in place; it runs longitudinally under the propeller to stabilize the rudder. A chain - the preventer - is attached to keel by a metal loop and is currently hanging loose; when in use, the preventer was attached to the rudder and prevented it from pivoting too far in either direction.

Theta's strakes are attached to the stempost and sternpost with slot-headed wood screws and attached to the frames with square-cut brass nails. As discussed previously in connection with the Half-Decked Barge Wreck, the use of square-head nails suggests a construction date around 1893. However, she could have been constructed later if the boat-builder had this fastener type in stock. Further, her engine is another attribute that assists in determining a construction date for *Theta*. Assuming it is original to the boat, MHM suggests a construction date of 1900 and definitely before 1910; drip oilers fell out of use at that time when lubricating oil was mixed directly into gasoline (Grayson 1998, 62). Further, the wreck's engine appears to be a Westman, constructed by the Enterprise Machine Company of Minneapolis, although the builder's plate is corroded beyond recognition. If the engine is a Westman, it was constructed in 1900 or later.[2] The wreck's design - long benches on both port and starboard - indicates she was used for passenger transportation around Lake Minnetonka. Her small size and shallow draft made her a good choice for small excursion parties; she could access both the Upper and Lower lake easily, including shallower bays and near shorelines. She could also transport light cargo or be part of the mail delivery system on the lake when needed. Small gasoline launches could have working lives of 20 years or more; MHM suggests a construction date of 1900 and sinking date of around 1920. MHM submitted an archaeological site form for *Theta* to the OSA in late October 2018 and received her site number, 21-HE-514, at that time.

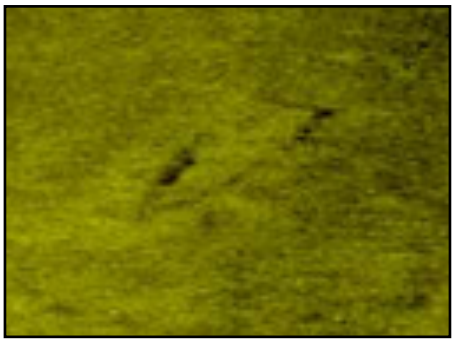


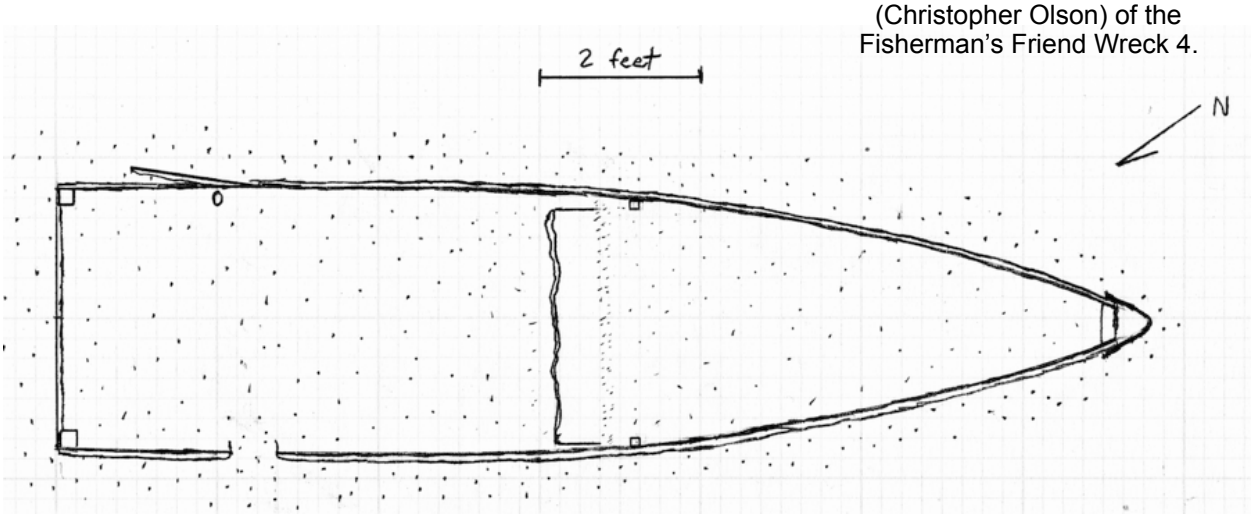
A sketch of the *Theta* Wreck (Christopher Olson).

[2]Emil Westman of Minneapolis worked as a machinist beginning in 1894 and in 1896, he worked for the G. F. Kriesel Company. In 1900, he was a foreman at the Enterprise Machine Company and by 1912, he was the company's Vice President (Harrison & Smith 1894, 989; Minneapolis City Directory Company 1896, 1129, 1900, 1431, 1912, 1977.

Fisherman's Friend Wreck 4 Site, 21-HE-509 (Anomaly 715)

MHM recorded a sonar image of Anomaly 715 in September 2011 during the LMS-1 Project but did not recognize the wreck. In June 2018, an identifiable sonar image of the wreck was recorded during the LMNA-8 Project. The Fisherman's Friend Wreck 4 derives its name from the model of small wooden rowboat produced by the Ramaley Boat Company in 1913 or later at its Wayzata location (Ramaley purchased Moore Boat Works in 1912 and began production after that boating season). Another possible manufacturer of the boat was Wise Boat Works of Wayzata. The design is simple and the vessel could have been built by an established boat works or an amateur boat-builder. The first Fisherman's Friend Wreck (21-HE-485) is capsized, the Fisherman's Friend Wreck 2 (21-HE-489) is extremely degraded, and the Fisherman's Friend Wreck 3 (21-HE-499) is relatively intact but is affected by water erosion in shallow water. Anomaly 715 is 13.50 feet long, 3.20 feet in the beam and she has a 13.20-inch depth of hold.





A sonar image (MHM) and sketch (Christopher Olson) of the Fisherman's Friend Wreck 4.

The wreck's bow is sharply pointed and has a metal plate attached to the outside, bent around the deteriorated stempost. The metal plate is suggestive of an icebreaker but with this small vessel, it acted as a bow reinforcement - probably a repair to keep the boat afloat. The transom stern is simple and square with corner frames. Frames are found amidships just forward of an athwartships bench that is loose in the hull. The gunwale is intact on the starboard side with the exception of a piece out of the quarter. The port side of the wreck is more damaged, beginning amidships toward the stern, but the gunwale survives at the quarter. The hull is simply constructed of wide thin planks on port, starboard, and at the transom. The bottom hull planking runs athwartships, a defining attribute of Fisherman's Friend models, and the wreck has a hard chine. A metal spike is sticking out of the hull on the port side quarter - its function may have been linked to a now missing aft bench seat. The thinness of the wreck's planks is probably a result of water erosion and the small amount of sediment in the wreck's hull suggests water moves through the area somewhat quickly. The simple design of

Anomaly 715 - fewer frames and three-plank hull construction - suggests she may have been home-built. The Fisherman's Friend Wreck 4 was constructed in the 1890s or early 1900s, and since the average lifespan of a small wooden boat was not extremely long, a site disposition date of 1905-1915 is reasonable. MHM submitted an archaeological site form for the Fisherman's Friend Wreck 4 to the OSA in late-September 2018 and received her site number, 21-HE-509, at that time.

Views of the bow (Mark Slick).

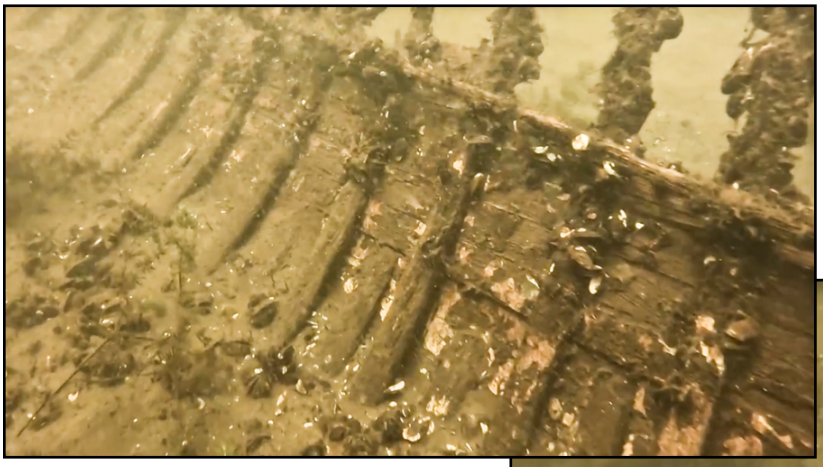
A frame and views of the stern (Mark Slick).

Wooden Motor Boat Wreck 4 Site, 21-HE-513 (Anomaly 729)

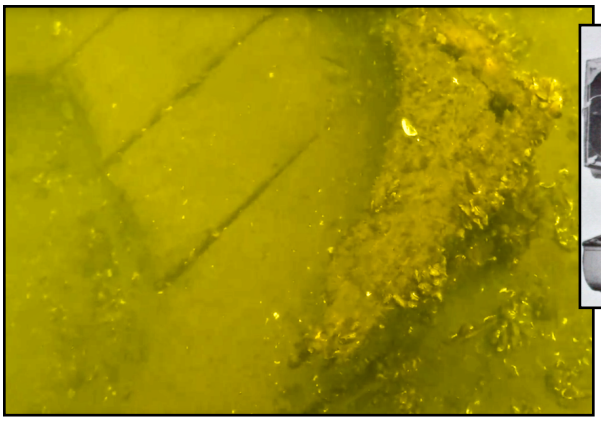
MHM recorded a sonar image of the Wooden Motor Boat Wreck 4 (Anomaly 729) during the LMS-2 Project in May 2012 but it was indistinguishable as a wreck. In mid-July 2018 during the LMNA-8 Project, MHM recorded a recognizable sonar image of the wreck. The Wooden Motor Boat Wreck 4 is 13.10 feet long, 3.20 feet in the beam and at the transom. She is carvel-built of thin wood strip strakes and has a hollow bow design. At the bow, the stempost is intact, one port strake survives and the port frames are gone. The starboard side strakes and frames survive past the turn of the bilge from the bow to the stern. At the turn of the bilge at the bow, portions of stringers survive on port and starboard; further aft the starboard stringer is seen from amidships to the stern. Two more stringers are located further up the inner hull and they partially survive on both port and starboard. Sections of the hull lie in the silt next to the wreck on the starboard and port quarters; the wreck has a ‘splayed’ appearance because of this attribute. The gunwale has survived on the starboard side fore and amidships - it is held up in the water column by fragmented strakes and complete frames, comprised of floors and

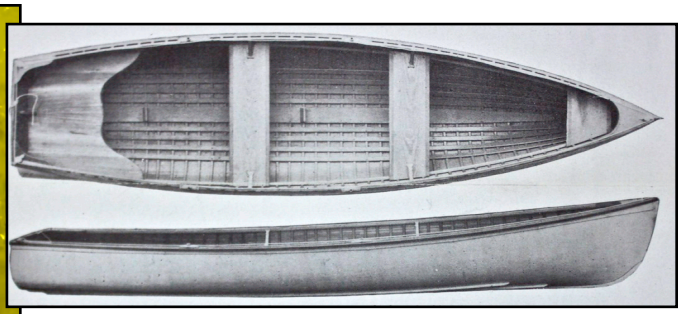
futtocks. The port side is in a similar - but more deteriorated - condition than the starboard side, with no surviving gunwale or upper strakes amidships, although the turn of the bilge is intact. A metal oarlock is extant on the starboard side amidships, attached to a small gunwale fragment - an athwartships bench seat lies inside the hull, no longer attached, and the transom is complete. The transom is designed to accommodate a small outboard motor with a lowered area in the middle of the gunwale, while the port and starboard gunwale sections are flat. Both stern corners are reinforced with gunwale-level horizontal knees and the stern is rounded at the chine. A distinctive attributed found at the stern of Anomaly 729 is her broad rear bench that is comprised of 4 planks running longitudinally. The wreck's sides and inner hull were painted white.

A sonar image of the Wooden Motor Boat Wreck 4 (MHM).



Views of the Wooden Motor Boat Wreck 4 (Kelly Nehowig).

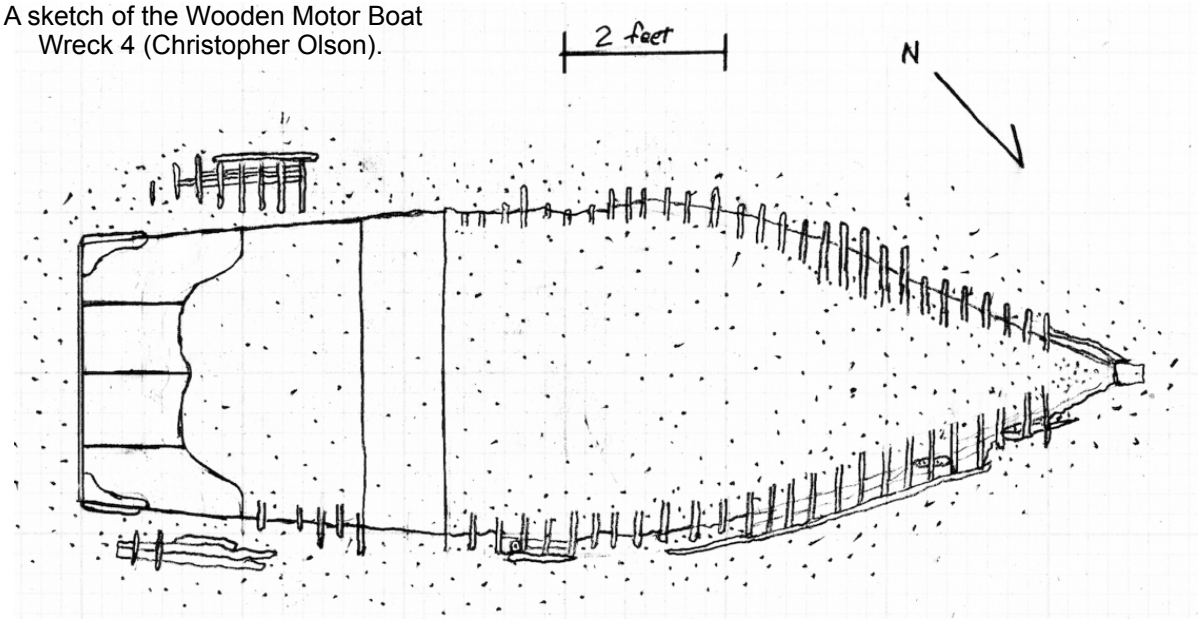




The port stern quarter knee and rear seat (Ed Nelson) and the Ramaley Standard Model Smooth Skin Detachable Motor Boat (Ramaley 1913).

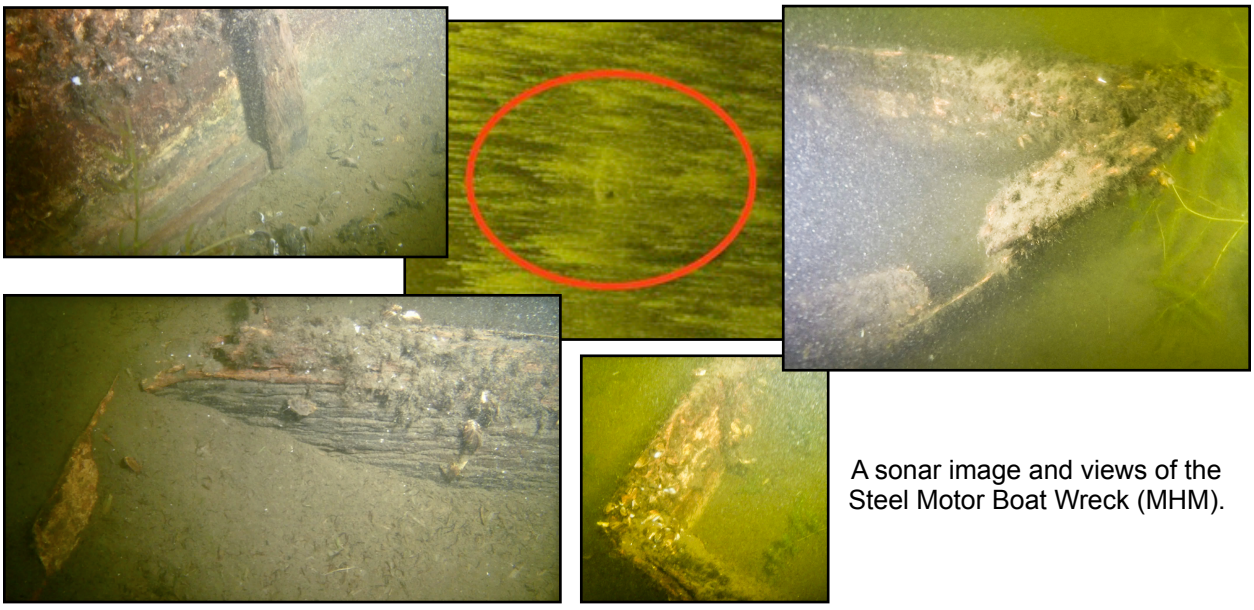
In terms of Anomaly 729's construction date, MHM contends she was built around 1910 due to her broad transom, a design preferred by boat builders after the introduction of detachable outboard motors. By 1906, the first portable and detachable outboard motor was produced in Detroit - the 'Waterman Outboard Porto'. Then, between 1906-1908 on the Kinnikinnic River near Milwaukee, Ole Evinrude designed, constructed, and tested his detachable row boat motor comprised of a single cylinder made of brass and iron. By 1911, Evinrude partnered with a tug company and backed by that money, soon employed 300 workers and produced thousands of outboard motors (Desmond 2001, 16-18). Also, Anomaly 729's refined, tapered bow - the aforementioned 'hollow bow' - is suggestive of the generation of small elegant rowboats produced by boat builders from the mid-19th Century into the early 1910s. Therefore, her design represents a transition between unpowered rowboats and craft capable of carrying outboard motors while maintaining their stability. Further, the Wooden Motor Boat Wreck 4 has been on the lake bottom for decades. Her 'skeletal' nature and the worn condition of her surviving strakes and frames supports a site disposition date of 1925 - a working life of 15 years. Anomaly 729's hull has a trace of silt in her hull, indicating that water moves through this area of Lake Minnetonka quickly and does not drop much sediment. MHM submitted an archaeological site form for the Wooden Motor Boat Wreck 4 to the OSA in early October 2018 and received her site number, 21-HE-513, at that time.

A sketch of the Wooden Motor Boat Wreck 4 (Christopher Olson).



Steel Motor Boat Wreck Site, 21-HE-510 (Anomaly 720)

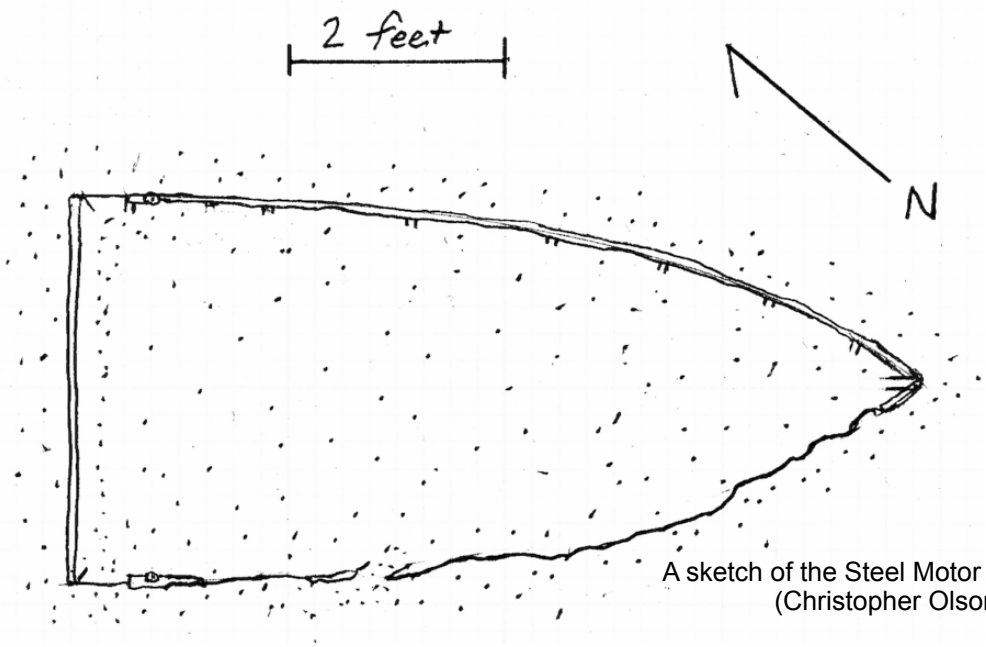
MHM recorded a sonar image of Anomaly 720 in May 2012 during the LMS-2 Project. The image appeared to be a rock or other small object and was clear of the weed line. During the LMNA-8 Project in June 2018, an identifiable sonar image was recorded, even through thick weeds; the lake depth levels between the two sonar recordings had changed enough to shift the weedline. The Steel Motor Boat Wreck is 7.80 feet long and 3.60 feet wide in the beam. Despite the wreck's small size, it is difficult to see the site in her entirety due to the proliferation of weeds, she is covered in zebra mussels, and the soft silt gets disturbed easily resulting in low visibility conditions. Anomaly 720 is constructed of thin steel plates. The wreck's bow is sharply pointed and the stern is wide and square with a thick wooden motor board that extends the entire width of the transom. The wreck's gunwale is complete on the port side and transom, but it is damaged on the starboard side fore and amidships. A wooden caprail survives at the bow and in various places along both sides of the hull. A wooden rubrail was originally attached to the gunwale; it survives on the bow and port side. The wreck's frames are made of wood and survive primarily on the port side along with a wooden stringer running longitudinally at the turn of the bilge. Two oarlocks are attached to the gunwale on both quarters, rather far aft. The outer hull was painted white and much of the paint survives.



A sonar image and views of the Steel Motor Boat Wreck (MHM).

One of the earliest manufacturers of small steel boats was the W. H. Mullins Company of Salem, OH. By 1905, the Mullins Company was constructing boats to carry motors and by the mid-1910s, small Mullins steel boats were designed to carry outboard motors on their transom. One model, 'The Outboard Special', has a wooden rub rail and stringers that suggest the construction of Anomaly 720. Also, some Minneapolis companies produced small steel boats in the early 20th Century including the Minneapolis Steel Boat Company, O'Hara Brothers Boat Company, and the Sanderson Boat and Engine Company (*Minneapolis Journal* 1905; *Minneapolis Tribune* 1904; W. H. Mullins Company, 1916). MHM does not contend that Anomaly 720 was constructed by Mullins or one of the local companies, but the similarities to the early steel boats from

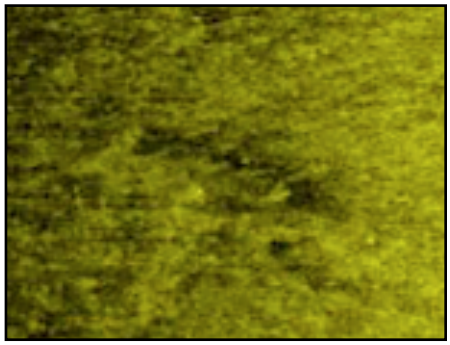
these companies and the wreck's utilitarian design and small size suggest that the Steel Motor Boat Wreck was constructed between 1915 and 1920. MHM contends she was home-built and due to her condition, MHM supposes she sank prior to 1930. MHM submitted an archaeological site form for the Steel Motor Boat Wreck to the OSA in late-September 2018 and received her site number, 21-HE-510, at that time.



A sketch of the Steel Motor Boat Wreck (Christopher Olson).

Wooden Motor Boat Wreck 3 Site, 21-HE-506 (Anomaly 695)

MHM recorded a sonar image of the Wooden Motor Boat Wreck 3 (Anomaly 695) during the LMS-1 Project in September 2011 but it was indistinguishable among the lake's vegetation. MHM volunteer Kelly Nehowig located Anomaly 695 in November 2017 while diving and in early June 2018, MHM recorded a recognizable sonar image of the wreck. The Wooden Motor Boat Wreck 3 is 12.00 feet long, 4.20 feet in the beam, and 3.20 feet at the transom. She is carvel-built of thin wood strip strakes. The gunwale has not survived at the bow, it is nearly intact on the port side quarter but the rest of the port side is missing, and only a small section of the gunwale survives on the starboard side amidships. The square transom is intact and shows tumblehome at both quarters with a rounded chine. One starboard side frame has survived to its futtock, although many floors/frames survive beneath the silt in the hull. At the stern, a motor board is attached to the inner hull and two knees in the form of simple angled props provide stability on port and starboard in support of the missing outboard motor. Part of a seat brace is attached on the inner starboard hull forward of amidships. The wreck's sides were painted white and her bottom, near and below the waterline, painted red.

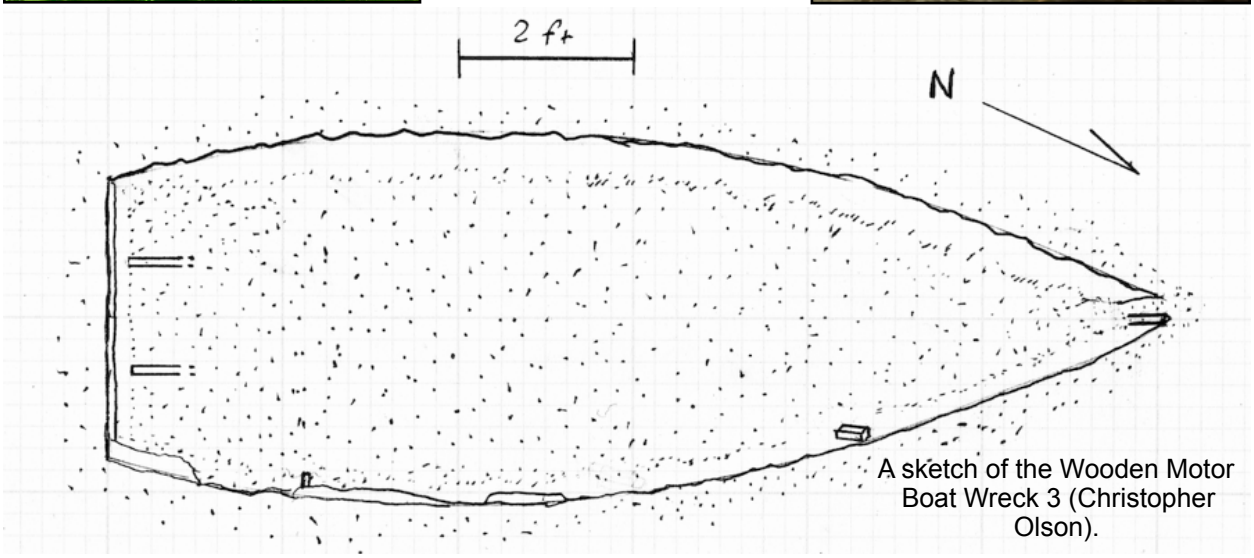


A sonar image of the Wooden Motor Boat Wreck 3 showing that the wreck was surrounded by profuse weeds (MHM).

In terms of Anomaly 695's construction date - and

compared to the Wooden Motor Boat Wreck 4 above - MHM contends she was built around 1915 due to her broad transom, a design preferred by boat builders after the introduction of detachable outboard motors. The transom also exhibits a raised and rounded gunwale on either side of the flat gunwale where the motor board is attached; this design is seen in early motor boats of the mid-1910s and later. Further, the Wooden Motor Boat Wreck 3 has been on the lake bottom for decades. Her strakes are worn thin from water movement and her damaged condition supports a site disposition date of 1930 - a working life of 15 years. Anomaly 695's hull has roughly 2 inches of silt on her bottom - her location within a consistently weed-filled area prohibits large amounts of silt from settling inside the wreck. MHM submitted an archaeological site form for the Wooden Motor Boat Wreck 3 to the OSA in mid-September 2018 and received her site number, 21-HE-506, at that time.

The bow and stern of the Wooden Motor Boat Wreck 3 (Kelly Nehowig).

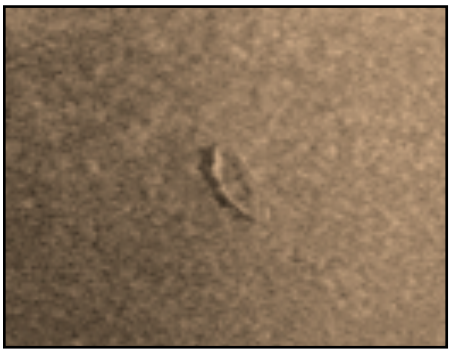


A sketch of the Wooden Motor Boat Wreck 3 (Christopher Olson).

Update: Shell Lake Portager Wreck, 21-HE-508 (Anomaly 264)
Former Small Aluminum Wreck

MHM recorded sonar images of Anomaly 264 during the LMS-1 Project in September 2011 and again during the LMNA-8 Project. MHM identified Anomaly 264 as a small aluminum wreck in early June and late July 2014 during the LMNA-3 Project. In mid-June and July 2018, MHM investigated the anomaly again, this time with improved visibility and with three questions to answer: 1. is Anomaly 264 made of aluminum or

fiberglass; 2. can the partial logos on the port and starboard quarters be deciphered; and 3. does the wreck have a builder's hull number. The wreck is 11.50 feet long with a 38.40 inch beam at her widest point and the gunwale has a flat sheer. During the LMNA-8 Project, on-site underwater archaeological and maritime historical research on Anomaly 264 determined the wreck has a fiberglass hull with an extruded aluminum gunwale that was attached to the boat with slot-headed bolts and nuts. Her transom stern narrows at the bottom creating a trapezoidal shape with a rounded chine where it meets the wreck's flat bottom. At the transom, a wide and flat wooden motor board was inserted between two layers of fiberglass and was topped with an aluminum caprail that is now missing. Stern castings were attached to the port and starboard corners; the port casting is missing. A carrying handle is attached to the inside transom with slot-headed bolts and nuts through the fiberglass and the wooden motor board; a small piece of rope is attached to the handle. Her gently rounded bow is suggestive of a canoe and it is damaged - MHM supposes a bow casting is missing. She has three bench seats, the one nearest the stern is exceptionally wide, and the 2 port side oarlocks are extant - attached to the caprail with slot-headed bolts and nuts, while the starboard side examples are missing. Both sides of the wreck are damaged amidships, with long cracks running longitudinally along the hull. The hull was painted SLBC's color 'marsh brown', or what is more commonly called 'dead grass' by other boat companies of the time.

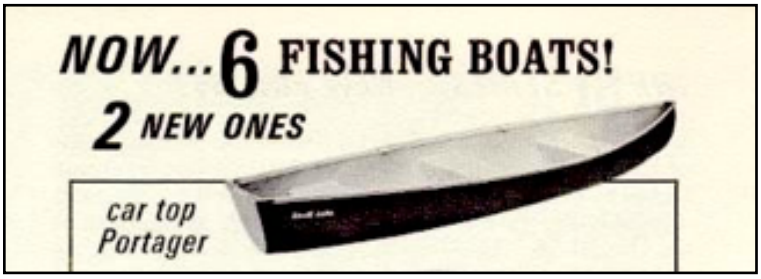


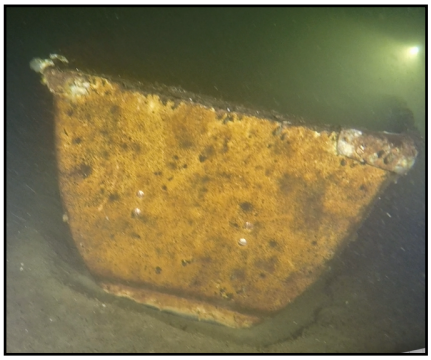
A sonar image of the Shell Lake Portager Wreck (MHM).

The Shell Lake Portager Wreck (Kelly Nehowig).

The bow and stern of the Shell Lake Portager Wreck (Mark Slick).

The 1968 and 1966 versions of the Shell Lake Portager (Shell Lake Boats, Inc., 1966, 1968).

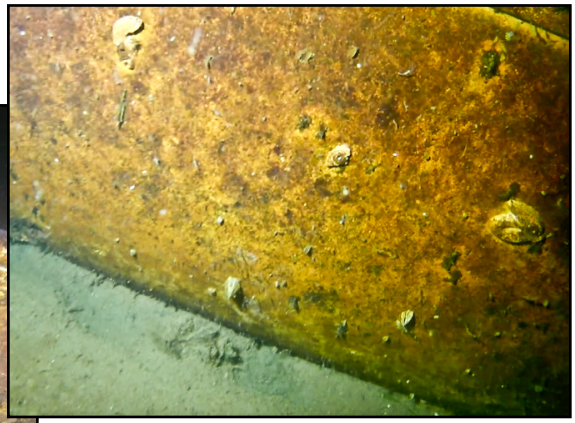


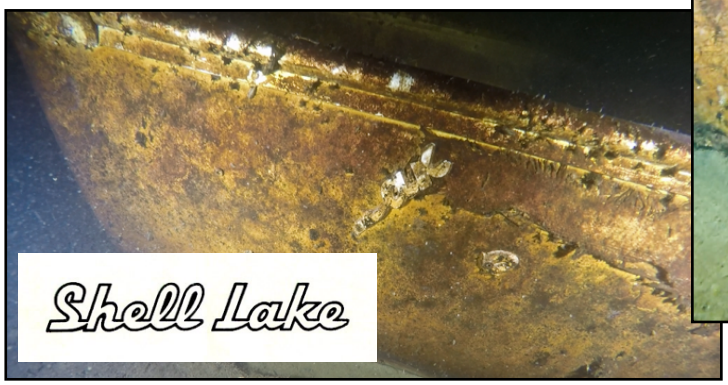


Looking toward the stern of the Shell Lake Portager Wreck (Mark Slick) and the .brass identification plate - P OD 1218 - on the inner transom (Ed Nelson).

The starboard side quarter's partially-surviving logo is now discernible when compared to data collected in 2014. The logo's two pieces spell - *Lak e* - and the other partial logo spells - *S(hell) (Lak)e* - on the port side. The design of the raised letters was the evidence that led MHM to determine the wreck was constructed by the Shell Lake Boat Company (SLBC) of Shell Lake, Wisconsin.[3] Also in 2018, MHM recorded a manufacturer's production number or identification number stamped into a brass plate - that is attached with short nails through the inner layer of fiberglass into the motor board - on the inside transom of Anomaly 264's stern: P OD 1218. MHM contacted the Washburn County Historical Society (WCHS) in Wisconsin, holder of a SLBC ledger, inquiring about number P OD 1218. Unfortunately, the number does not conform to the recorded serial/hull numbers in the late 1940s company documents. For example, the WCHS holds a Shell Lake Boat Company Snipe Jr. model in their collection with the serial/hull number 103 285. This data translates to model 103 (Snipe Jr.) and the 285th hull constructed by the company - recorded as being sold on June 4, 1948 (Clay Tallant, personal communication, August 2018). Another example of SLBC hull number configurations is associated with a 16-foot Scamp Deluxe model that was stolen from the company's factory in April 1953; her number was 16635 (Rhude 2009, 15). Again, a number that does not resemble the number plate of Anomaly 264.

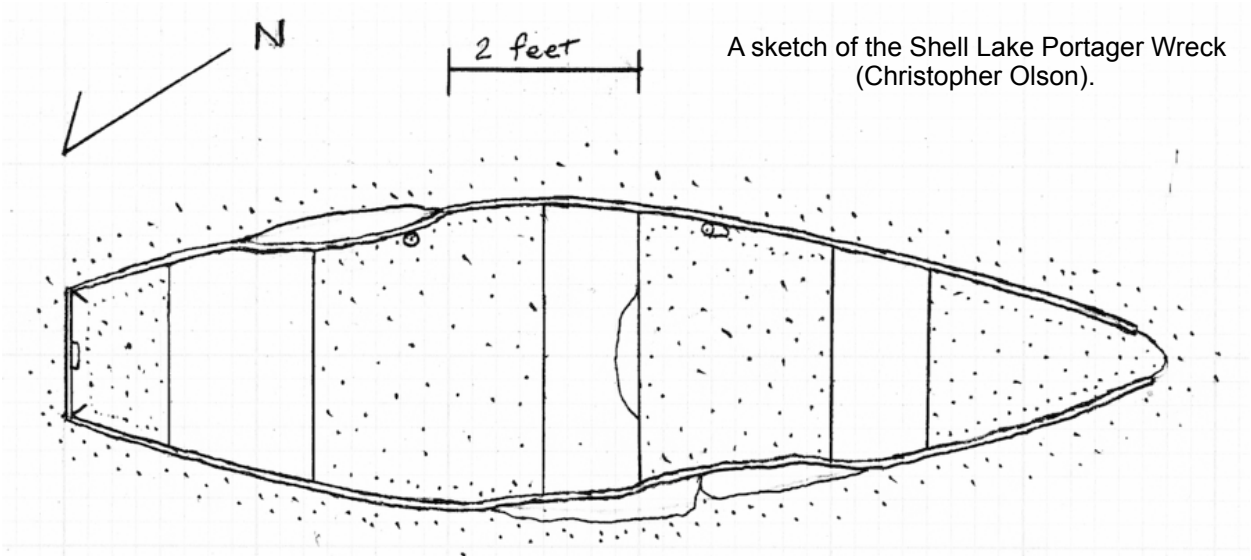
The partial Shell Lake logos on the port and starboard quarters of the wreck (MHM, Mark Slick).





[3]Shell Lake Boat Company was founded in December 1904 and changed hands over the years. In 1968 it was purchased by Lund Metalcraft of New York Mills, MN, and for some time the boats produced in the Shell Lake fashion retained the name and logo. In 1977, Arctic Enterprises [Arctic Cat] purchased Lund and Larson boats; the last Shell Lake boat was constructed in 1980 (Rhude 2009, 14, 18).

Therefore, MHM contends Anomaly 264 is an early version - post-World War II/late 1940s - of the SLBC's 1966 small car topper Portager craft constructed when fiberglass use by the company was still in its infancy. The 1966 and later Portager models - 12.58 feet long and 43 inches in the beam - were larger than Anomaly 264 (11.50 feet long, 38.40 inches) and had a narrower stern (Shell Lake Boats, Inc. 1966). Further, the use of slot-headed bolts to attach the aluminum caprail and carrying handle to the fiberglass hull suggests must earlier construction that 1966; most boat makers used rivets when working with aluminum and Phillips head screws were in common use after 1936 - they were the standard for manufacturing industries during World War II (Rybczynski 2000, 83-85). Also, the lack of a balsa wood core in Anomaly 264 indicates she was not constructed after 1960. SHBC ceased boat production in 1960 due to bankruptcy and when the factory resumed fabricating watercraft in 1961, all the fiberglass boats had balsa wood cores. Lastly, Anomaly 264 does not have - and never had - a Minnesota registration number or year validation stickers on her bow. Therefore, Anomaly 264 was constructed and sank before July 1, 1959. MHM contends the Shell Lake Portager Wreck was constructed around 1948 and sank around 1958. Fortunately the wreck lies in an area with little sediment build-up and MHM has observed that the wreck wobbles at times - large boat wakes can reach the depths where Anomaly 264 lies. When she moves, the light silt surrounding her rounded chine is pushed away from the hull, exposing her completely with the exception of her bottom. MHM submitted an archaeological site form for the Shell Lake Portager Wreck to the OSA in late September 2018 and received her site number, 21-HE-508, at that time.

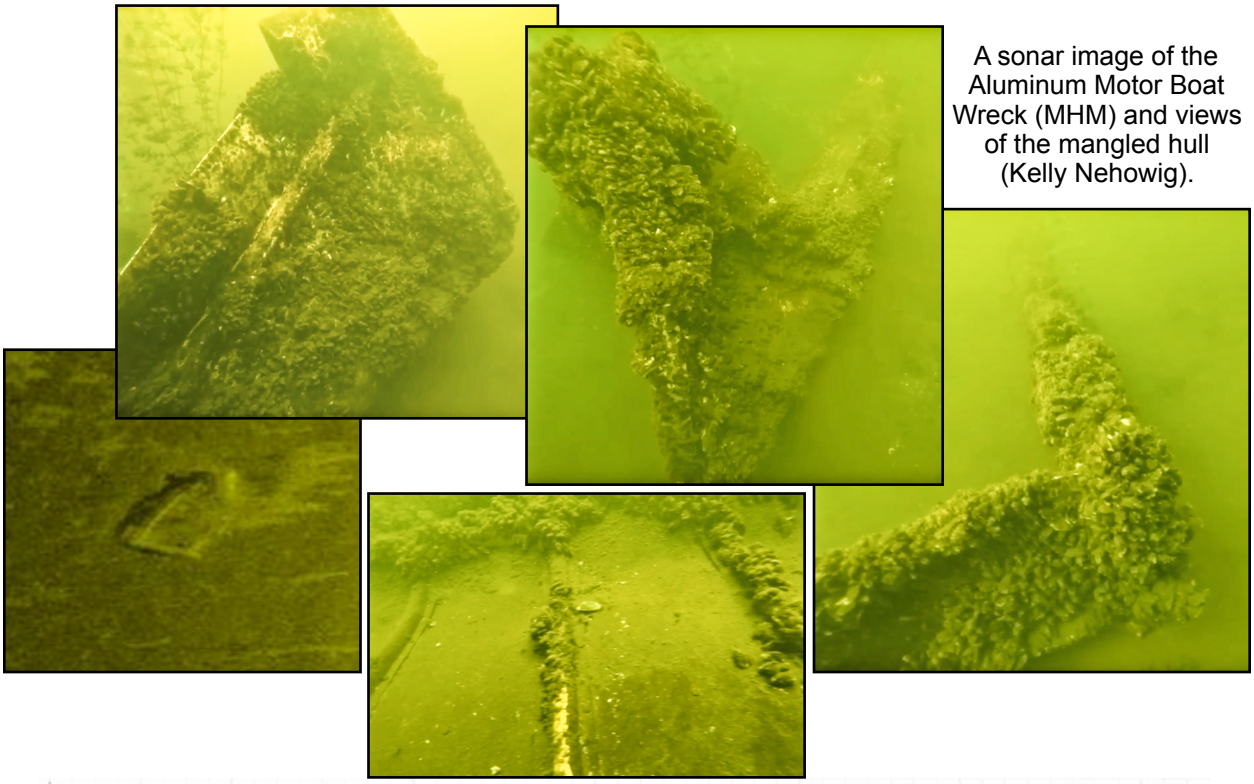


A sketch of the Shell Lake Portager Wreck (Christopher Olson).

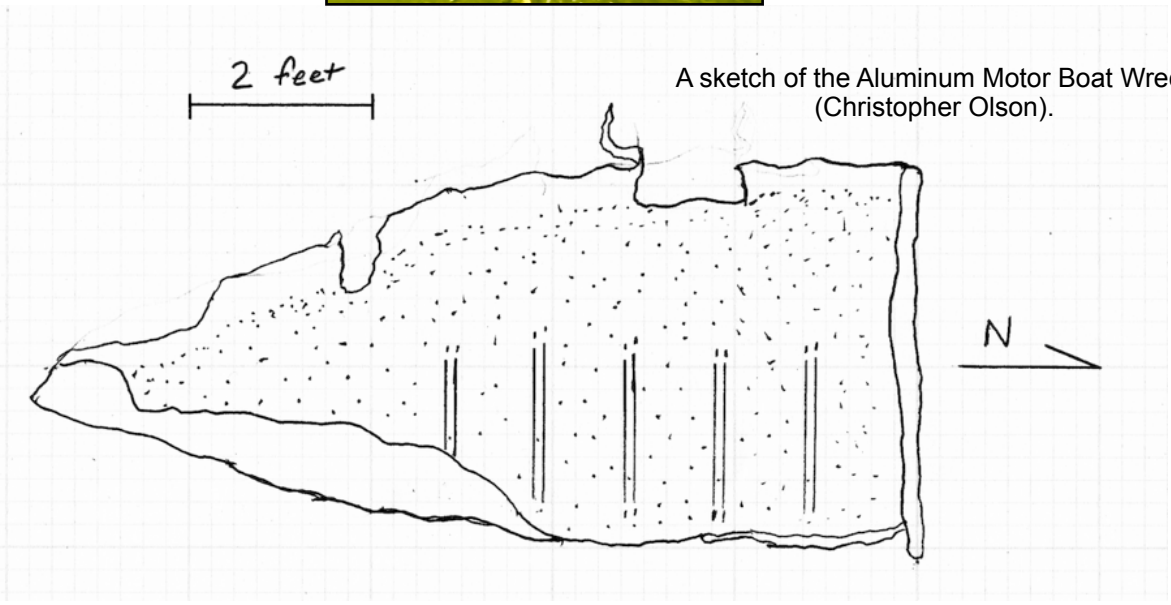
Aluminum Motor Boat Wreck, 21-HE-507 (Anomaly 725)

MHM recorded a sonar image of the Aluminum Motor Boat Wreck (Anomaly 725) during the LMS-2 Project in May 2012 but due to the wreck's actual size and size of the recorded sonar anomaly, it was a low priority target. MHM recorded another image of the anomaly in June 2018 and the acoustical signature was obviously a small wreck. Anomaly 725 is 9.60 feet long, 4.30 feet in the beam, and she currently has a 1.40-foot depth of hold; her original length was more than 11.00 feet long, possibly 12.00 feet. The Aluminum Motor Boat Wreck is damaged throughout her hull. The bow is bent upward and inward off the lake bottom and the damage is distinctive ; it appears that the

boat was hit on both sides by other watercraft or by some heavy objects. Two large holes are ripped into the starboard hull forward of amidships and on the quarter, with the metal peeled toward the bow. The overall hull is misshapen and her extruded aluminum gunwale is missing. However, even considering the extensive damage to the wreck, certain attributes survive and are distinguishable. The most obvious surviving attributes are the riveted extruded aluminum frames consisting of floors and futtocks running athwartships throughout the wreck's wide flat bottom and up the turn of the bilge. Additionally, stringers are attached to the inner hull above the turn of the bilge on both sides of Anomaly 725. Underneath thick zebra mussels at the stern, a wooden motor board has survived and along the entire length of the starboard and port outer hull, a substantial and complete splashrail is seen.



A sonar image of the Aluminum Motor Boat Wreck (MHM) and views of the mangled hull (Kelly Nehowig).

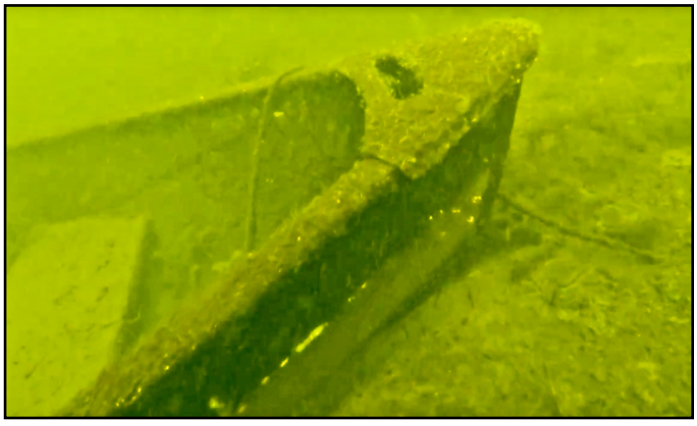


A sketch of the Aluminum Motor Boat Wreck (Christopher Olson).

MHM suggests a construction date for the Aluminum Motor Boat Wreck of 1948. Post-war American boat-builders, both established companies and new enterprises, began constructing aluminum boats for wide distribution. Minnesota companies Alumacraft [Aluma Craft] and Larson were two of the most successful small aluminum boat-building beginning in 1947-1948 (Hunn 2006, 12). Anomaly 725 exhibits details - particularly the whole-hull splashrail - not seen in other early aluminum boats, suggesting Minnesota manufacture. Further, an early date of 1948 is supported by the complete absence of seats in the hull, suggesting the seats were wooden benches, not U-shaped and formed of aluminum with flotation foam inside them. Also, the bow is bluff and somewhat stubby, not a trait seen in later aluminum fishing boats[4] and her stern corners are somewhat sharp and utilitarian, with no castings or handles for easier carrying that are found in later models. MHM contends the Aluminum Motor Boat Wreck sank prior to July 1, 1959 based on her lack of any Minnesota boat registration evidence. Silt build-up in her hull cannot be used to determine a possible disposition date since the wreck is located within a consistently weed-filled area that prohibits large amounts of silt from settling inside the wreck. MHM submitted an archaeological site form for the Aluminum Motor Boat Wreck to the OSA in mid-September 2018 and received her site number, 21-HE-507, at that time.

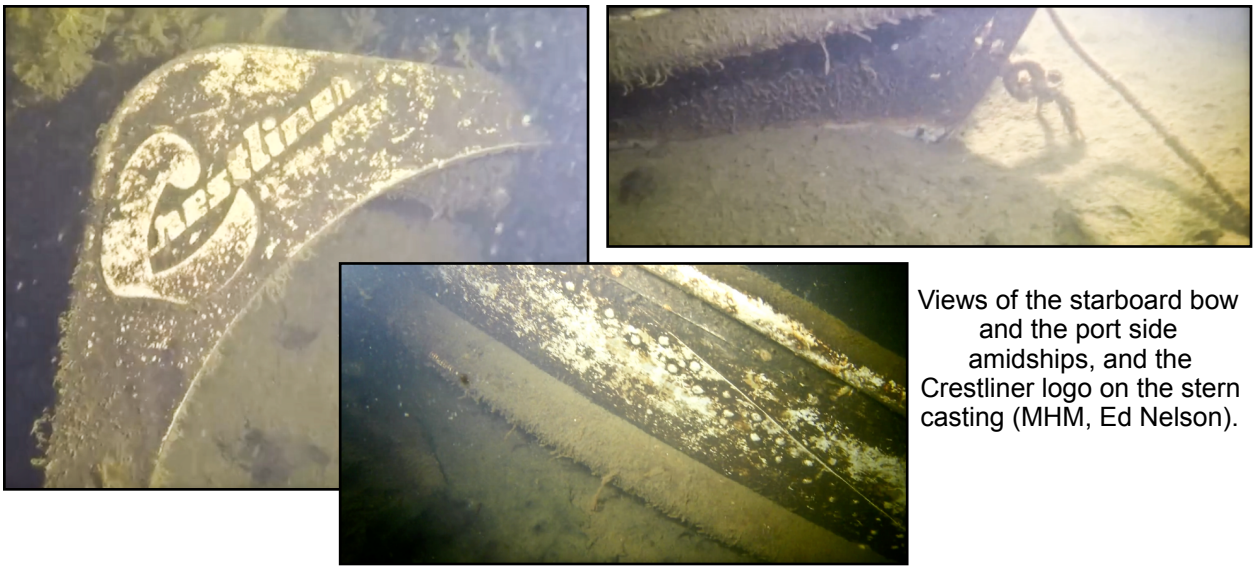
Crestliner Sportsman Wreck Site (Anomaly 722)

MHM recorded an ambiguous sonar image of Anomaly 722 during the LMS-2 Project in May 2012. In June 2018, MHM recorded a detailed image of the wreck using new sonar equipment. In late June and early August during the LMNA-8 Project, MHM dove on the site and identified her as a smooth-hull aluminum Crestliner wreck that is 11.80 feet long and 49.20 inches in the beam. Based on the size of the wreck and her smooth hull (as opposed to a faux lapstrake design), MHM determined Anomaly 722 is a Sportsman model constructed between 1954-1962. However, the specifications for the 1961 Sportsman exactly matches Anomaly 722. The wreck has a bow casting with a carrying handle and both the starboard and port quarters have stern corner castings that provide a strong join for the gunwales and the transom. The castings have the cursive ‘Crestliner’ logo on them. The square transom is designed for an outboard motor and is comprised of a wooden motor board attached inside the stern. Stern knees inside the transom provide further strength to the keel and 2 sister keelsons on the hull’s bottom.



A sonar image of the Crestliner Sportsman Wreck (MHM) and the starboard bow of the wreck (Kelly Nehowig).

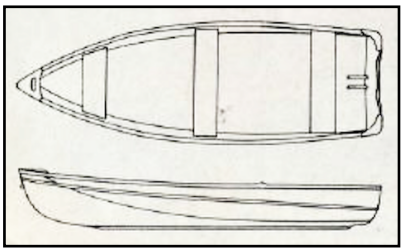
[4]Small aluminum hunting boats often had bluff bows but they did not have splashrails and other attributes found in fishing boats.



Views of the starboard bow and the port side amidships, and the Crestliner logo on the stern casting (MHM, Ed Nelson).

Anomaly 722 has 3 wooden benches attached at the vessel's sides with aluminum brackets with air chambers underneath. for flotation. A towing eye is attached to the stempost and a long line is attached to it that winds around the wreck. A substantial splash rail extends the entire length of the outer hull on both port and starboard. The gunwale, with an aluminum caprail attached by rivets, is intact throughout the wreck and the hull is painted white. The Minnesota registration numbers on both the port and starboard sides of the wreck were entirely removed prior to the intentional scuttling of Anomaly 722. However, 2 orange and green year validation stickers were left on both sides of the bow. The orange sticker dates to 1969-70 and is a label from the Minnesota Conservation Department. The green sticker's year cannot be determined but it was also assigned by the Conservation Department, indicating the sticker was purchased prior to 1972 when the MCD became the Minnesota DNR. The Crestliner Sportsman Wreck cannot be categorized as an archaeological site at this time, but she State and Federally protected maritime historical resource.

Two Minnesota Department of Conservation year validation stickers on the starboard side bow (MHM).



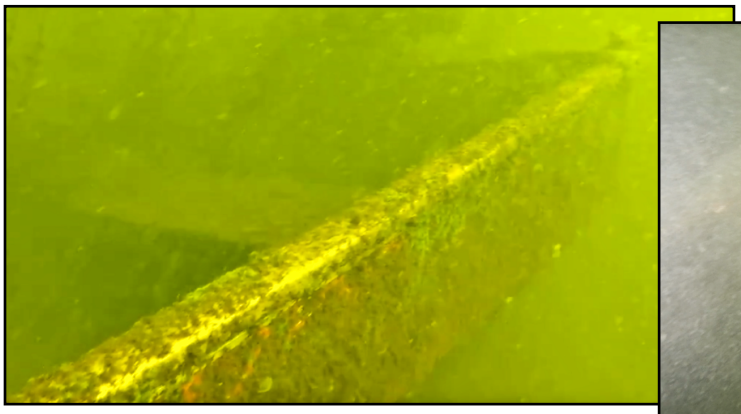
A diagram of the Crestliner Sportsman and proof that the boat did i not require a trailer (Crestliner, Inc., 1956, 1957.).

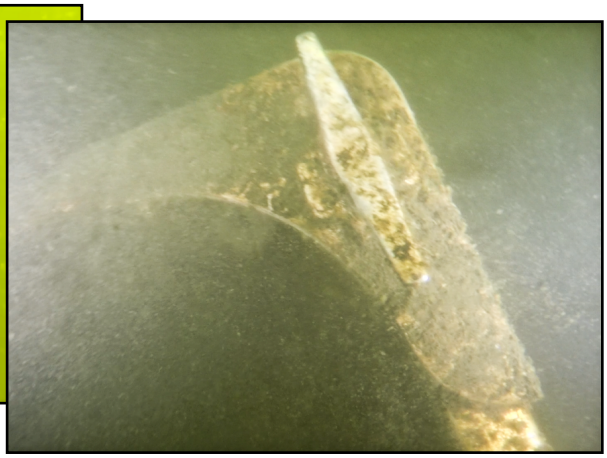
Larson Game Warden Wreck Site (Anomaly 726)

MHM recorded an image of Anomaly 726 in September 2011 during the LMS-1 Project but the wreck was not recognized within the sonar data. In June 2018 during the LMNA-8 Project, MHM recorded new images of the anomaly that were clear and detailed - and did not look like a wreck. The ambiguous nature of the new sonar footage resulted from the wreck's position on the lake bottom. Anomaly 726 is lying at an angle listing to starboard on the side of a small rise, causing interesting diving conditions. The port side of the wreck is higher and can usually be clearly seen, but the starboard side is nearly buried in silt in slightly deeper water and is nearly obscured. Anomaly 726 is 12.00 feet long, 4.20 feet in the beam, she has a Deephaven dockage sticker number 163, and her Minnesota registration number is MN 0887 AQ. This letter sequence was assigned to a watercraft in 1959 - but not Anomaly 726. The wreck is a Minnesota-built Larson aluminum boat constructed in 1965 and her last registration - 1980-1982 - expired on December 31, 1982 (John Nordby, personal communication, August 31, 2018). The yellow validation stickers affixed to her port and starboard bow agree with this registration expiration date; the port sticker is nearly gone but the starboard sticker survives intact. MHM has discovered several wrecks on the bottom of Minnesota's lakes with ambiguous or outright contradictory information that has been reported to the DNR. In considering Anomaly 726, MHM contends that her owner had a boat registered in 1959 with the number 0887 AQ and when the 1965 Larson was purchased, the number was (inappropriately) transferred to the new boat. Therefore, the identification of the original vessel assigned this number cannot be determined because the registration information for the years 1959-1972 were destroyed when the Department of Conservation became the Department of Natural Resources.

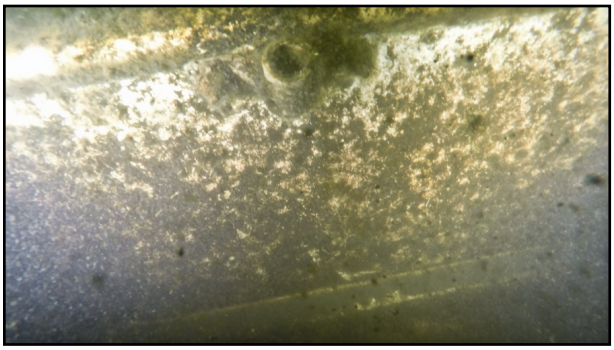
A sonar image (MHM), port side view and Larson logo (Ed Nelson), the Larson logo (Larson Boat Works, Inc. (1961), and the wreck's registration number and Deephaven dock sticker (Mark Slick).

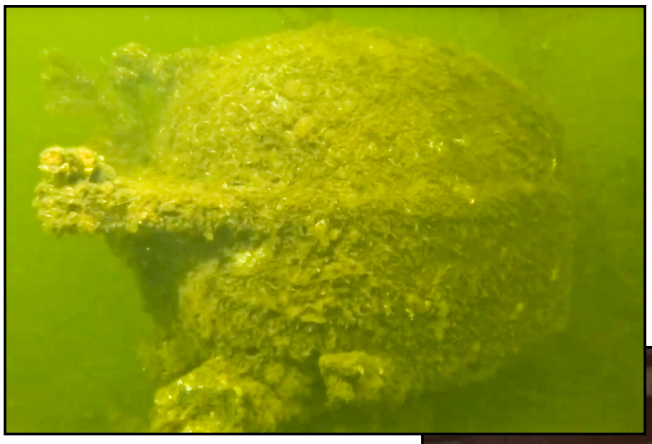
MHM contends Anomaly 726 is a Game Warden model of Larson open fishing boat, the only 12-foot aluminum boat Larson produced in 1965 (*Popular Boating* 1965, 138). The wreck has 3 seats formed of aluminum and a triangular casting and anchor roller with a deployed anchor line at the bow. Anomaly 726 has aluminum frames attached to her bottom and a longitudinal stringer is attached to the inner hull above the turn of the bilge. Two oarlocks are found amidships, attached to an extruded aluminum caprail that makes up the gunwale. The port stern quarter has a triangular gunwale-level casting and a cleat; it is assumed the starboard quarter has the same fittings. Two carrying handles are attached to the transom stern and the wreck is painted red. The Larson logo is painted in white on the port side quarter and a partial boat's name is affixed to the stern with blue stickers with white letters: ***DRIFT.*** The rest of the name is buried under silt on the starboard side and may be accessed in the future; MHM suggests the unknown part of the name is *AWAY* or *WOOD*. The wreck carries an outboard motor that MHM contends is a 1950-1956 Johnson Sea Horse of 10 HP or less and it is either green or blue with an offset-to-starboard pull. Lastly, the listing nature of Anomaly 726 is explained by the presence of a large Danforth anchor and its line that is snagged on the amidships bench. It is apparent that a larger boat - probably greater than 25 feet due to the size of the Danforth - snagged on the wreck and during attempts to raise it, pulled Anomaly 726 significantly onto her starboard side before the line was cut and the anchor abandoned. MHM contends Anomaly 726 sank between 1980-1982 and she was motoring on the lake at the time; her motor is tilted down in the operating position. The Larson Game Warden Wreck cannot be categorized as an archaeological site at this time, but she is a State and Federally protected maritime historical resource.

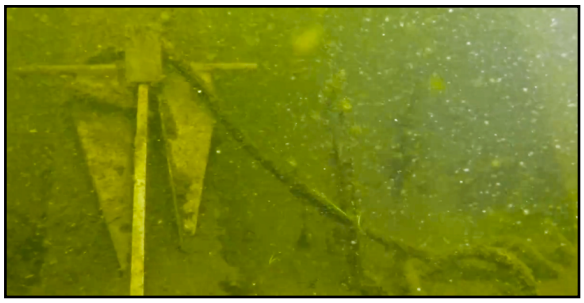




The port quarter of the wreck (Ed Nelson), the port stern casting and cleat, one of the oarlocks with a stringer seen below, and half of the wreck's name: *DRIFT* (Mark Slick).







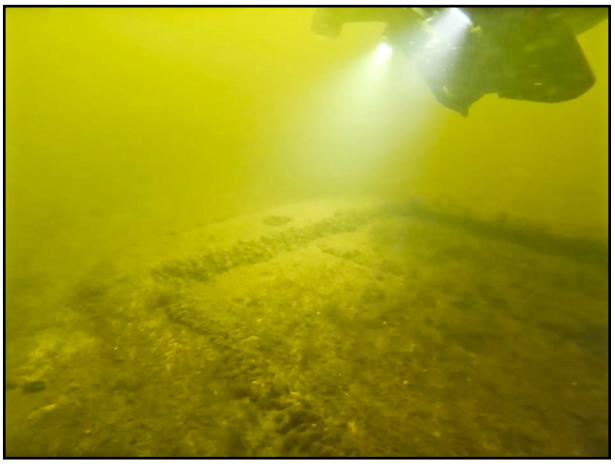
The wreck's motor power head (Kelly Nehwoig), the Danforth anchor that was caught on the wreck (Ed Nelson), and the 14-foot version of the Game Warden model (Larson Boat Works, Inc., 1961).

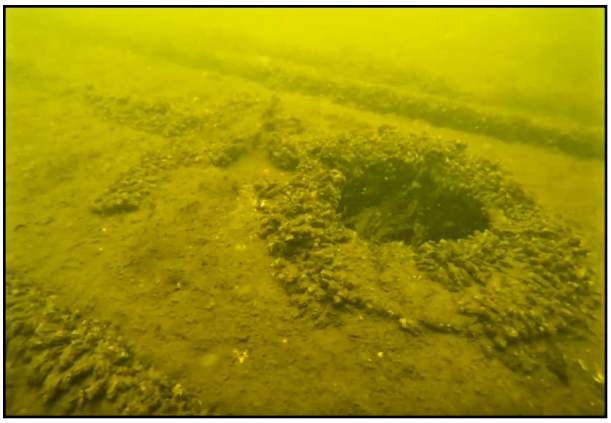
Fiberglass Scow Sailboat Wreck (Anomaly 688)

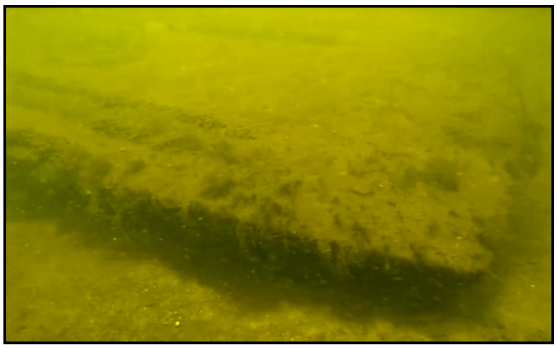
MHM recorded an unrecognizable sonar image of Anomaly 688 during the LMS-2 Project in May 2012 but the site was not recognized. MHM friend and supporter Mike Brill suggested we investigate the area and in early June 2018, MHM recorded a detailed image of the wreck using new sonar equipment. In mid-June and mid-August during the LMNA-8 Project, MHM dove on the site and identified her as a fiberglass scow sailboat wreck that is 11.80 feet long and 3.80 feet in the beam. The hull has no discernible construction logos or registration stickers. Between 2 holes, a slit in the hull indicates where a centerboard would drop below the boat. Anomaly 688's design is suggestive of a sailboard but the wreck is hollow and does not have a solid hull. It is apparent that the hull was originally green but it it now yellow. A wide hole is located in the center of the vessel and the mast hole is located forward. The Fiberglass Scow Sailboat Wreck cannot be categorized as an archaeological site at this time, but she is a State and Federally protected maritime historical resource.

MHM's sonar image of Anomaly 688 (red circle) from 2012 is ambiguous, especially compared to the 2018 data below.

Toward the bow of Anomaly 688 (Kelly Nehowig).



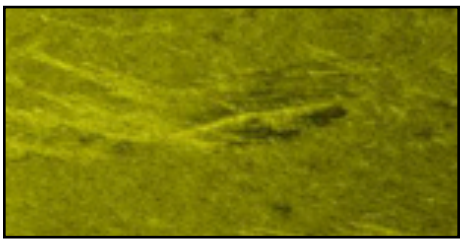




The central hole into the wreck and the stern of Anomaly 688 (Kelly Nehowig).

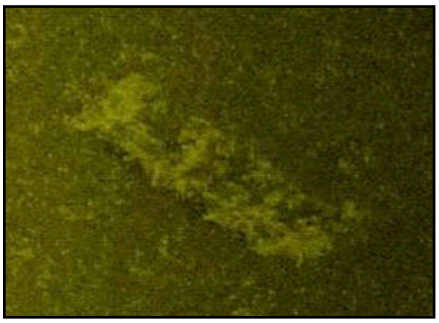
Pontoon (Anomaly 737)

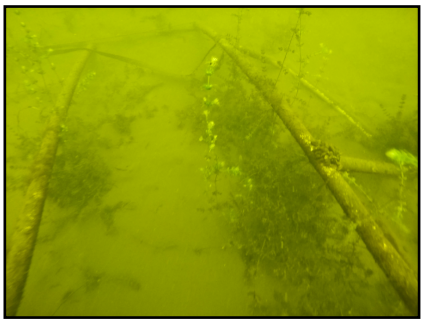
MHM recorded a sonar image of Anomaly 737 in May 2012 during the LMS-2 Project and identified the site in early June 2018 as a single pontoon. The pontoon is 9.60 feet long and 1.70 feet in diameter. Anomaly 737 is a protected maritime cultural resource currently under the jurisdiction of the DNR.

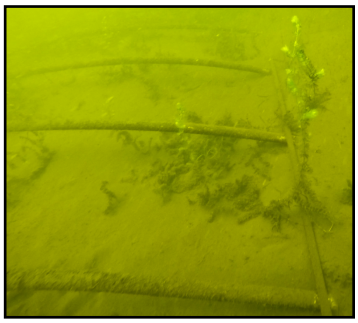


Boat Canopy Site (Anomaly 721)

MHM recorded a sonar image of Anomaly 721 in May 2012 during the LMS-2 Project and identified the site in late June 2018 as a large canopy frame from a boat lift or dock. The frame is 27.70 feet long and 11.50 feet wide. The frame likely blew into the lake and sank during high winds. Anomaly 721 is a protected maritime cultural resource currently under the jurisdiction of the DNR.



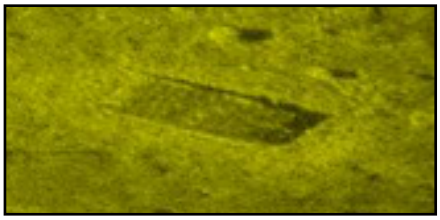




MHM's sonar image of Anomaly 721 and images of the canopy frame (Kelly Nehowig).

Dock Site (Anomaly 736)

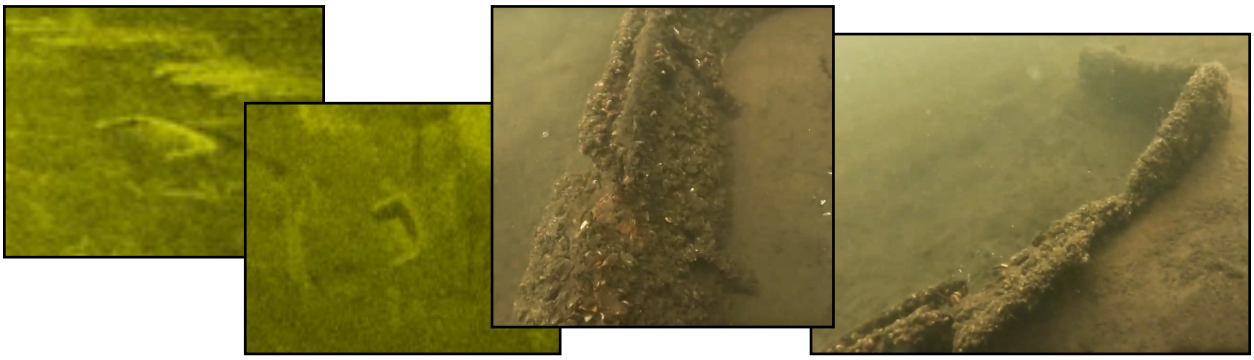
MHM recorded an ambiguous sonar image of Anomaly 736 during the LMS-2 Project in May 2012, but MHM friend and supporter Mike Brill suggested we investigate the area. New sonar footage revealed Anomaly 736 is a section of sunken dock. MHM attempted to locate the dock in mid-July in zero



visibility conditions and was unsuccessful. However, the new sonar image is sufficient to determine the dock is between 6.00 and 8.00 feet long. Anomaly 736 is a protected maritime cultural resource currently under the jurisdiction of the DNR.

Possible Wreck Section (Anomaly 731)

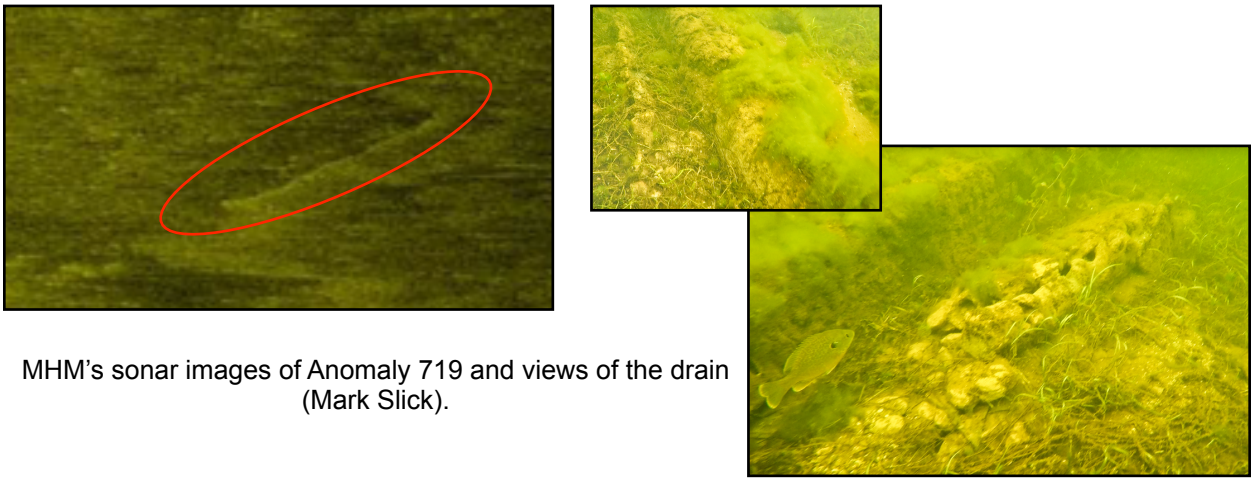
During the LMS-1 Project in September 2011, MHM recorded sonar footage of the area where Anomaly 731 is located, but it was obscured by think vegetation. In mid-July 2018 during the LMNA-8 Project, a clear sonar image was recorded and Anomaly 731 resembled a bimini top from a power boat. Upon diving on Anomaly 731, it was determined not to be a folded bimini top but a large metal U-shaped object with frames. MHM suggests Anomlay 731 is part of a boat, but its exact identification remained unknown. Anomaly 731 is 3.00 feet long and 5.00 feet wide and is a protected maritime cultural resource currently under the jurisdiction of the DNR.



MHM's sonar images of Anomaly 731 and images of the anomaly (Kelly Nehowig).

Drainage Infrastructure Site (Anomaly 719)

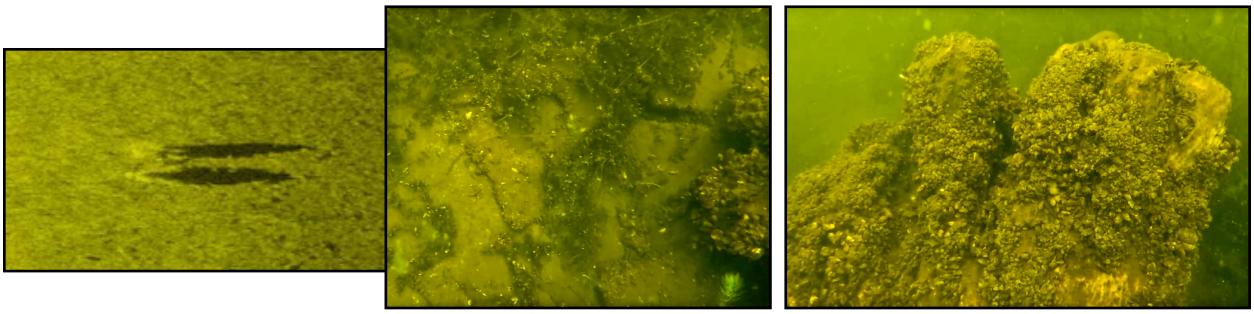
During targeted sonar survey, MHM recorded an image of Anomaly 719 in mid-June 2018. The image appeared to be a small wreck and MHM investigated the anomaly during the LMNA-8 Project and determined it is a section of thick broken ceramic drainage pipe with gravel and stones packed around it; the drainage ditch around the pipe is obvious in the lake bottom. Anomaly 710 is a protected cultural resource currently under the jurisdiction of the DNR.



MHM's sonar images of Anomaly 719 and views of the drain (Mark Slick).

Fishing Spot Site (Anomaly 680)

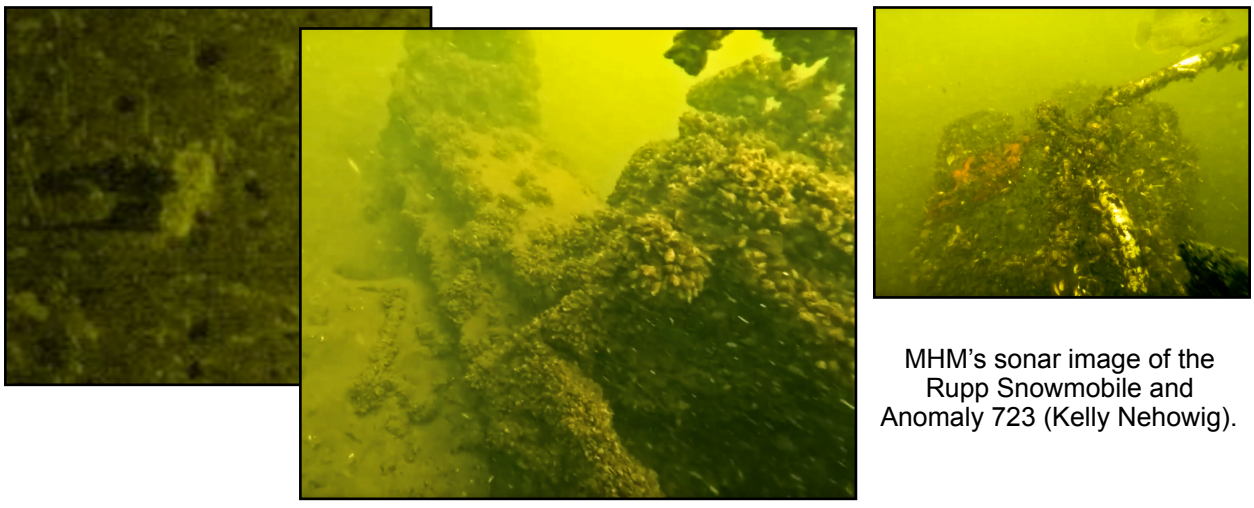
MHM recorded a sonar image of Anomaly 680 during the LMS-2 Project in May 2012. It appeared to be 2 objects - one triangular and one irregularly-shaped. Sonar footage from 2018 did not add any additional data. MHM investigated Anomaly 680 in early July during the LMNA-8 Project and identified the objects as 2 cut tree stumps placed on and surrounded by concrete blocks. MHM contends the blocks and stumps were placed on the ice in this configuration to sink after ice-out to create an artificial reef to attract fish. Anomaly 680 is a protected maritime cultural resource currently under the jurisdiction of the DNR.



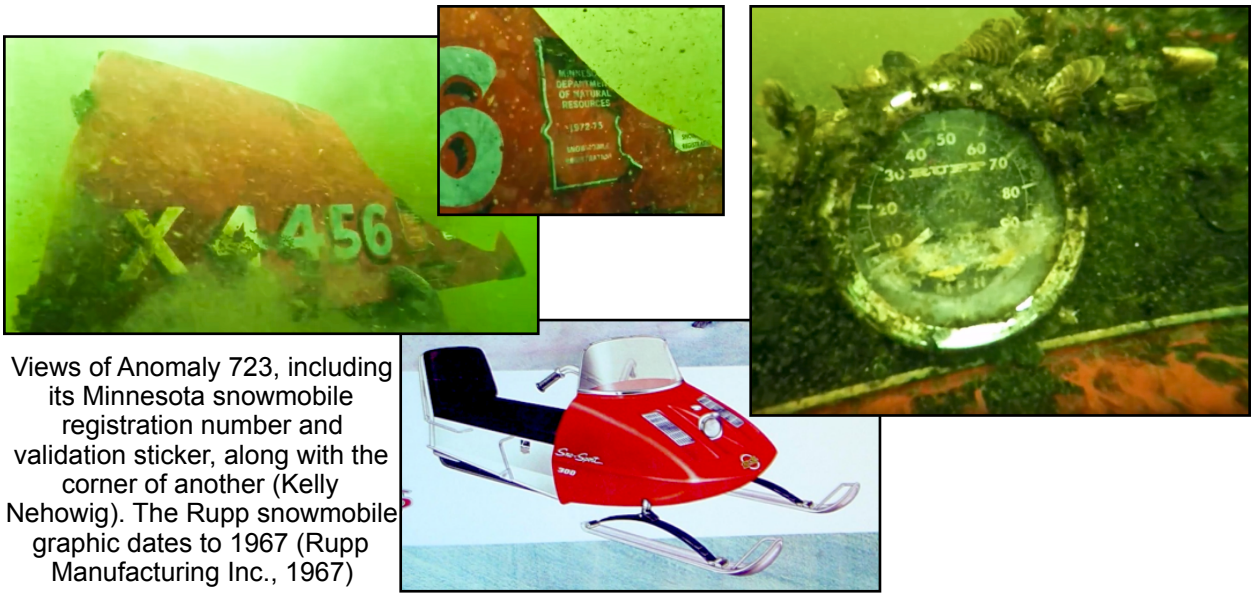
MHM's sonar image of Anomaly 680 and views its concrete blocks and 1of the tree stumps (Ed Nelson).

Rupp Snowmobile Site (Anomaly 723)

MHM recorded a vague and ambiguous sonar image of Anomaly 723 during the LMS-2 Project in May 2012. New sonar footage - especially the acoustical signature cast by Anomaly 723 - indicated it was a snowmobile. MHM investigated the anomaly in late June 2018 and confirmed it is a red Rupp Snowmobile. Rupp Manufacturing, Inc. was founded in 1959 in Mansfield, OH. The company was known for building go karts and mini bikes. A snowmobile prototype was manufactured in 1964 and in 1965, the company produced 500 snowmobiles for sale. Anomaly 723 was likely constructed in 1966 and is a Sno Sport model, a conclusion based on its design (Kenyon ND). Its Minnesota registration number is X 4463 and a surviving red snowmobile validation sticker dates to 1972-75. Anomaly 723 is a protected cultural resource currently under the jurisdiction of the DNR.



MHM's sonar image of the Rupp Snowmobile and Anomaly 723 (Kelly Nehowig).



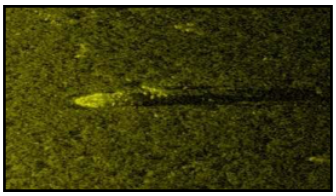
Views of Anomaly 723, including its Minnesota snowmobile registration number and validation sticker, along with the corner of another (Kelly Nehowig). The Rupp snowmobile graphic dates to 1967 (Rupp Manufacturing Inc., 1967)

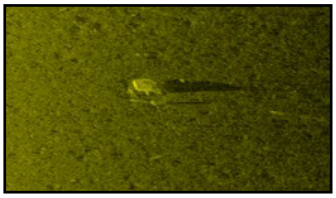
1986 Polaris Indy 600 Snowmobile Site (Anomaly 660)

MHM recorded an ambiguous sonar image of Anomaly 660 during the LMS-2 Project in May 2012. New sonar footage - especially the acoustical signature cast by Anomaly 660 (like Anomaly 723 above) - indicated it was a snowmobile. MHM investigated the anomaly in early June 2018 and confirmed it is a black and blue Polaris Indy 600 Snowmobile, Model 0860757. Polaris Industries was founded in 1954 in Roseau, MN. Anomaly 660 is the second Polaris snowmobile MHM has identified on the bottom of Lake Minnetonka; the other is Anomaly 289, a 1990 blue Indy 500 Classic model. Anomaly 660 is a protected cultural resource currently under the jurisdiction of the DNR.

MHM's sonar image of Anomaly 660 and views of the Polaris Indy 600 Snowmobile (Mark Slick).

Snowmobile Site (Anomaly 738)

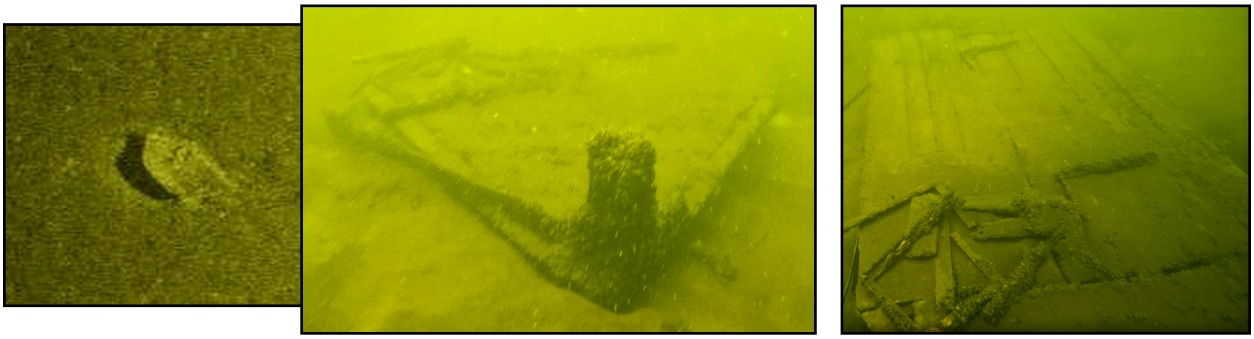




MHM recorded an ambiguous sonar image of Anomaly 738 during the LMS-2 Project in May 2012. New sonar footage - while much better than the previous data - did not shed light on the identification of Anomaly 738. In mid-July, in zero visibility conditions, it was determined the object is a 1980s-1990s snowmobile. No video or photos were possible because of site conditions. Anomaly 738 is a protected cultural resource currently under the jurisdiction of the DNR.

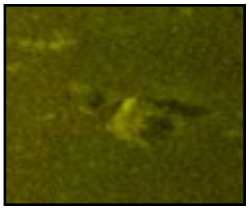
Shed Wall Site (Anomaly 708)

MHM recorded an ambiguous sonar image of Anomaly 708 during the LMS-2 Project in May 2012. New sonar footage suggested Anomaly 708 was a small wreck. MHM investigated the anomaly in early June 2018 and determined it is one quarter of a small shed. Initially the shed wall was thought to be part of a fish house, but the design of the object confirmed for MHM that is part of a small building - but not a fish house. The shed side is 7.60 feet long and 3.80 feet wide with a door. Anomaly 708 is a protected cultural resource currently under the jurisdiction of the DNR.



MHM's sonar image of Anomaly 708 and views of Shed Wall Site (Mark Slick).

Barrel Site (Anomaly 751)

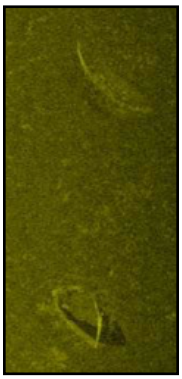


MHM has recorded several sonar images of Anomaly 751 over the years during targeted sonar scanning in Lake Minnetonka; the object appeared to be a rock or other small solid object. A brief dive on Anomaly 751 identified it as a metal barrel; it is a protected cultural resource currently under the jurisdiction of the DNR.

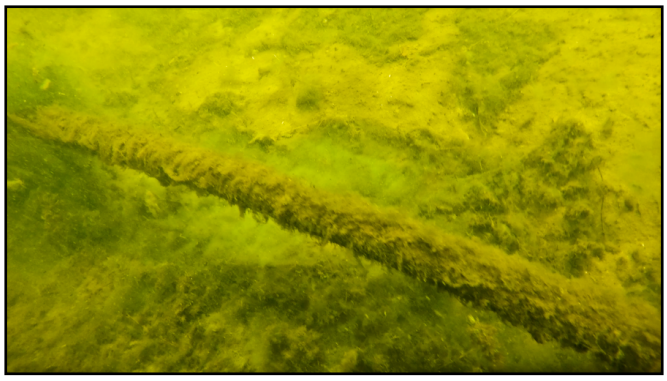
Cable (Anomaly 718)

During the LMS-1 Project in September 2011, the acoustical signature of Anomaly 718 did not record on the sonar footage of the area - unlike the Crystal Bay Rowboat Wreck (21-HE-457) seen in the sonar image below. However, in mid-June 2018 MHM recorded an image of Anomaly 718 during the LMNA-8 Project and it resembles a small wreck. MHM investigated the anomaly in late June and determined it is a large cable, one of

the many that can be found on the bottom of Lake Minnetonka. The wreck-like acoustical signature is actually a section of the cable that rises into the water column and then causes a ‘shadow’ on the lake bottom.



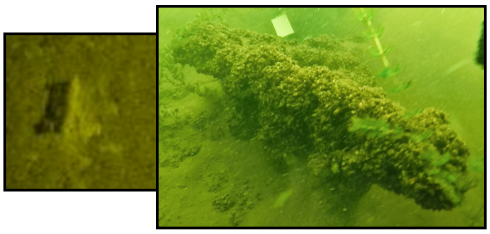
Anomaly 718, a Cable, is shown at the top of the sonar image to the left. MHM saw no evidence of a wreck in several sonar passes with the old equipment. The new sonar unit picked up the cable and the fact that it was raised off the lake bottom, making it resemble a wreck. The Crystal Bay Rowboat Wreck (21-HE-457) is seen at the bottom of the image. To the right, the Cable (Mark Slick).



Dock Slide and Ladder (Anomaly 585a)

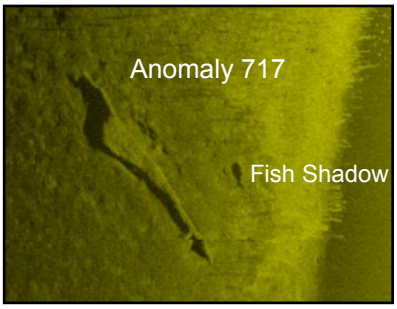
MHM recorded a detailed sonar image and dove on Anomaly 585a in late June 2018. MHM hoped this anomaly was the missing bow of a wreck documented in 2016 during the LMNA-6 Project - the Damaged Fiberglass Wreck (Anomaly 585). MHM has determined Anomaly 585a is a fiberglass slide and ladder from a dock. Anomaly 585a is a protected cultural resource currently under the jurisdiction of the DNR.

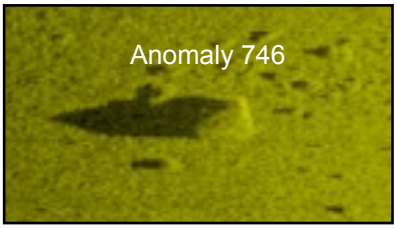
MHM’s sonar image of Anomaly 585a and a part of the object (Kelly Nehowig).



Anomalies 717, 730, 746, 750

MHM investigated Anomalies 717, 730, 746, and 750 during the LMNA-8 Project. While MHM was confident Anomaly 717 was a large tree prior to diving on the object, its sonar signature was odd, and diving was required to absolutely confirm it was a tree. Anomaly 717 is a tree and its peculiar acoustical signature stems from the shadow it casts because a large section of it is in the water column off the lake bottom. Anomaly 730 was determined to be a tree through examining sonar footage; diving on it was not required. MHM hoped Anomaly 750 was a steam boiler due to its size and shape; it is simply a very large rock - 12.00 long by 10.00 feet wide. Lastly, the acoustical signature of Anomaly 746 suggested it was a snowmobile; it is also a large rock with a white tablecloth nearby. MHM surmises the tablecloth went overboard off of one of the many excursion boats on Lake Minnetonka.





Anomaly 746 with the tablecloth on it (Mark Slick).

Conclusion

The LMNA-8 Project produced interesting and significant results, particularly identifying 10 new wrecks, 6 new maritime sites, 8 'other' sites including 3 snowmobiles and 1 barrel, 2 trees, 2 big rocks, and questions about 1 known wreck are now answered. Further, as part of the research design for the LMNA-8 Project, additional sonar surveys of targeted anomalies took place using new and greatly improved remote sensing equipment. The quality of the new data allowed MHM to determine the nature of 15 anomalies without conducting diving reconnaissance: A704 was identified as a tree and 14 others (A191, A214, A399, A400, A459, A470, A508, A580, A611, A673, A696, A701, A702, A703) were determined to be false targets (bottom contours or vegetation). Therefore, the final number of unknown anomalies identified during the LMNA-8 Project is 43. Further, 9 of the 11 wrecks dove upon during the project were discovered using improved sonar equipment; previous sonar survey data was either ambiguous or objects were not recognized as submerged cultural resources.

These wrecks and sites join dozens of other submerged cultural resources already identified in the lake. Comparing and associating these new sites with known sites increases our understanding of the historical context within which these cultural resources operated or were exploited by Minnesotans. Firstly, the Half-Decked Barge Wreck (21-HE-505) not only represents 19th Century transportation, but the commercial waterborne activities associated with bulk cargo carrying. Like the NRHP property the Wayzata Bay Wreck (21-HE-401) - an 85-foot barge owned and operated by J.J. Hill and his partners - the Half-Decked Barge Wreck probably transported cut wood and timber from the Upper Lake to Wayzata, transferring the cargo to Great Northern Railway trains headed to the Twin Cities.[5] Beyond this association, the Half-Decked Barge Wreck is a tangible example of the skill and knowledge of Minnesota boat builders of the latter 19th Century. The heavy and well-constructed wreck was built with longevity in mind; MHM contends a probable working life of over 30 years is not unreasonable. Like the Wayzata Bay Wreck, 21-HE-505 is a rare example of her kind since work boats like barges were rarely preserved for future generations.

The late 19th and early 20th Centuries saw the transition from the use of steam engines to the use of internal combustion engines to power watercraft. This change allowed for the widespread ownership of personal watercraft - gasoline launches, yachts, small craft - without the need to hire a licensed steam engineer to operate a boat's power plant. Therefore, the survival of the gasoline launch *Theta* Wreck on the bottom of Lake Minnetonka greatly enhances Minnesota's Maritime History - currently she is a one-of-a-kind nautical archaeological site in our State. MHM cannot determine - at this time - if *Theta* was constructed in Minnesota. However, MHM contends she was the creation of a local boat-builder such as Moore, Wise, Dyer, or Ramaley, and that her engine may have been fabricated by the Enterprise Machine Company of Minneapolis. While a few Minnesota-designed and constructed gasoline launches from the early 20th Century have survived - such as the Royal Moore-built *Harriet* - she is not of the same design or size as *Theta*. Surely *Theta* is a unique Minnesota nautical archaeological site but in a broader context, she is representative of wooden gasoline launches of her time that

[5]See MHM's *Wayzata Bay Wreck National Register of Historic Places Nomination* of 2015.

were constructed throughout the US. Her compromise stern in particular sets her apart from other Minnesota wrecks and the survival of her engine *in situ* is atypical in the State's archaeological record. Lastly, the presence of *Theta's* brass nameplate on both the starboard and port bow - also atypical - suggests that MHM should be able to research the complete history of the watercraft. To date, no mention of *Theta* has been located in the maritime historical record.

The three small wooden wrecks identified during the LMNA-8 Project - the Fisherman's Friend Wreck 4 (21-HE-509) and the Wooden Motor Boat Wrecks 4 (21-HE-513) and 3 (21-HE-506) join a fleet of other wooden small craft on the bottom of Lake Minnetonka. The Fisherman's Friend Wreck 4 is noteworthy because of its athwartships bottom planking and keel-less design, a construction method that required less skill to accomplish - but was nonetheless a sturdy design of the late 19th and early 20th Centuries. Of the 18 small wooden wrecks identified on the lake bottom to date,[6] this wreck – along with the Fisherman's Friend Wreck (21-HE-485) and Fisherman's Friend Wrecks 2 and 3 (21-HE-489, 21-HE-499), and the Flat-Bottomed Rowboat Wreck (21-HE-488) – are the only small examples with athwartships bottom planking. For comparison, the Hopper Barge Wrecks (21-HE-441), two of the larger wooden wrecks in the lake, are also athwartships planked. These 2 large and sturdy work boats were constructed by master craftsman Captain John R. Johnson of Excelsior.[7] These 7 examples of athwartships planked vessels, 2 large and 5 small, were similarly constructed. However, the skill level needed to produce them was vastly different; 4 of the small rowboats (21-HE-485, 21-HE-489, 21-HE-499, 21-HE-509) could have been constructed by a local boatworks or by an individual with minimal construction experience. The other small wreck (21-HE-488) and the Hopper Barges required more knowledge of watercraft construction and skill to produce. Further, the longitudinally-planked small boats identified during the LMNA-8 Project - the Wooden Motor Boat Wrecks 4 and 3 were designed and built by skilled boatwrights - joining 12 other craft of similar construction that date from the early 1900s to the 1950s. This group of 18 small boats joins other small craft housed in museums and collections in Minnesota that MHM has and is documenting;[8] together they form a significant historical legacy for all Minnesotans to learn from and enjoy.

The 2 small metal wrecks identified during this project - the Steel Motor Boat Wreck (21-HE-510) and the Aluminum Motor Boat Wreck (21-HE-507) are the earliest examples of small metal boats on the bottom of Lake Minnetonka. With the possibility that 21-HE-510 may have been constructed by a Minneapolis boat-building company, she is an important link in the State's metal craft production history. Further, the other 2 metal wrecks identified during the LMNA-8 Project - the Crestliner Sportsman Wreck (Anomaly 722) and the Larson Game Warden Wreck (Anomaly 726) - are Minnesota-built

---

[6]Gideon Bay Wreck (21-HE-415), Wayzata Bay Wreck (21-HE-417), St. Louis Bay Wreck (21-HE-422), Crystal Bay Rowboat Wreck (21-HE-457), Wooden Motor Boat Wreck (Anomaly 467), Maxwell Bay Rowboat Wreck (21-HE-469), Fisherman's Friend Wreck (21-HE-485), Wooden Sloop Wreck (21-HE-486), North Arm Rowboat Wreck (21-HE-487), Flat Bottomed Rowboat Wreck (21-HE-488), Fisherman's Friend Wreck 2 (21-HE-489), Fisherman's Friend Wreck 3 (21-HE-499), Wooden Motor Boat Wreck (21-HE-500), Hydroplane Wreck (21-HE-501), Hydroplane Wreck 2 (21-HE-502), Wooden Motor Boat Wreck 3 (21-HE-506), Fisherman's Friend Wreck 4 (21-HE-509), Wooden Motor Boat Wreck 4 (21-HE-513)

[7]See MHM's *LMNA-3 Project Report* for more information.

[8]See MHM's *Minnesota Small Craft Projects* for more information.

watercraft. These 2 boats join 5 aluminum Lake Minnetonka wrecks constructed by Minnesota companies Alumacraft,[9] Lund,[10] and Crestliner[11]. All 7 small metal wrecks found on the lake bottom are different models from each other or carry different attributes from each other, supplying great variety in the nautical archaeological record. Likewise, the Wisconsin-built fiberglass Shell Lake Portager Wreck (21-HE-508) is historically significant due to her early date, rarity, and her apparent status as a short production vessel that was introduced back into the company's line-up roughly 20 years later. Lastly, the Fiberglass Scow Sailboat Wreck (Anomaly 688) joins the Larson Fiberglass Sailboat Wreck (Anomaly 595) as the only vessels of this type yet identified on the bottom of the lake. The low freeboard of Anomaly 688 is similar to wooden scows found sailing on Lake Minnetonka, but her fiberglass construction suggests the design of a sailboard. These two aspects of Anomaly 688, a small and rather modern wreck in shallow water, raise many questions about her origins that have yet to be answered.

As more Minnesota wrecks are documented, the changes in watercraft design and construction will more completely fill-out the maritime historical record. Many of the smaller craft on the bottom of Lake Minnetonka represent nearly 140 years of our relationship with historical personal watercraft. When the internal combustion engine began to replace steam-powered boats in the late 19th and early 20th Century, watercraft operation became possible for 1 person to do since a boiler operator was not longer necessary. The rapid development of the outboard motor set up the proliferation of personal watercraft, made of wood, steel, aluminum, and fiberglass. The higher speeds attained by internal combustion engines also led to changes in hull design.

Other maritime sites identified during the LMNA-8 Project, the Pontoon (Anomaly 737), Dock (Anomaly 736), Dock Canopy (Anomaly 721), Dock Ladder Slide (Anomaly 585a), Fishing Spot (Anomaly 680), and Drainage Infrastructure (Anomaly 719) represent part of a boat, a vessel mooring place with 2 attributes associated with it, an artificial reef for recreation, and a shoreline modification. The 3 snowmobiles - a Polaris, Rupp, and an unknown brand (Anomalies 660, 723, 738) - identified during this project join a Polaris snowmobile (Anomaly 289) recognized several years ago. MHM is confident that there are many, many more snowmobiles still sitting on the lake bottom. Miscellaneous objects such as the Shed Wall (Anomaly 708), Cable (Anomaly 718), Barrel (Anomaly 751), and possible wreck part (Anomaly 731) are among dozens of objects blown into the lake by strong storms or deposited there by the habit of disposing of unwanted objects on the ice or dumped from boats.

The diversity of nautical, maritime, and underwater sites so far identified in Lake Minnetonka are tangible examples of the rich maritime history of the area. Through research, diving on wrecks and anomalies to collect pertinent data, and ensuring that the collected information is accessible by the public, MHM will continue to investigate Lake Minnetonka's submerged cultural resources into the future. As shown by the 9 new wrecks identified by MHM using new and improved sonar equipment during this project, the continued re-scanning of several sections of Lake Minnetonka is warranted.

---

[9]Alumacraft Center Console Model R Wreck (21-HE-448), Alumacraft Model R Wreck (Anomaly 20.1), Alumacraft Model A Wreck (Anomaly 462)

[10]Lund Aluminum Fishing Boat Wreck (Anomaly 69)

[11]Crestliner Admiral Wreck (Anomaly 689)

Comparison of sonar data recorded from different directions and during times of the year have revealed new sites as well as false targets that do not require reconnaissance using SCUBA. This new data allows MHM to produce smart and efficient dive plans; this will continue into the future. The results of the LMNA-8 Project summarized above is connected to all the work that came before and that will come after its completion. It is clear that the types of sites that exist in Lake Minnetonka are diverse, archaeologically and historically significant, and worthy of great attention. To date, the watercraft located on the bottom of Lake Minnetonka represent nearly 1,000 years of Minnesota's maritime history and nautical archaeology. In the historic period, the known wrecks represented in the lake span over 140 years of local maritime culture. The data collected during the LMNA-1-8 Projects have been utilized to create the Lake Minnetonka Multiple Property Documentation Form, a guide that will be used to nominate Lake Minnetonka's submerged cultural resources to the National Register of Historic Places (NRHP). At this point, the Wayzata Bay Wreck (21-HE-401) has been successfully nominated to the NRHP by MHM. Lastly, the large and significant data produced during the Lake Minnetonka projects has and will be used for comparison purposes as MHM identifies wrecks and maritime resources on the bottom of other Minnesota lakes. To date, these bodes of water include White Bear Lake, Lake Waconia, Prior Lake, Lake Johanna, Medicine Lake, and Lake Pulaski.

References

Crestliner. Inc. 1956. *Crestliner 1957*. Larson Watercraft, Inc.: Little Falls, MN.

_____. 1957. *Crestliner Aluminum Watercraft: Nineteen Hundred Fifty Eight*. Crestliner, Inc.: Little Falls, MN.

Desmond, Kevin. 2001, *A Century of Outboard Racing*. MBI Publishing Co.: Osceola, WI.

Grayson, Sam. 1998. *Old Marine Engines*. Devereux Books: Marblehead, MA.

Harrison & Smith. 1894. *Davison's Minneapolis City Directory for 1894-1895*. Harrison & Smith: Minneapolis, MN.

Hunn, Peter. 2006. *Tail Fins and Two-Tones: The Guide to America's Classic Fiberglass and Aluminum Runabouts*. Devereux Books: Marblehead, MA.

Kenyon, Keith. ND. "The History of Rupp Manufacturing, Inc!". OldRupps.com, http://www.oldrupps.com/RuppHistory/RuppHistory.html

Larson Boat Works, Inc. 1961. *Notice the Difference in Larson*. Larson Boat Works, Inc.: Little Falls, MN.

Marken, M.W., A. Ollendorf, P. Nunnally, and S. Anfinson. 1997. *Beneath Minnesota Waters: Minnesota's Submerged Cultural Resources Preservation Plan*. Summit Envirosolutions, Inc. and Braun Intertec, St. Paul. Report prepared for the State Historic Preservation Office, Minnesota Historical Society: St. Paul, MN.

Melchert, Ken. ND. *The Humble Nail - A Kew to Unlock the Past*. The Harp Gallery Antiques: Appleton, WI.

Merriman, Ann, and Christopher Olson. 2015. *Wayzata Bay Wreck National Register of Historic Places Nomination*. Maritime Heritage Minnesota: St. Paul, MN.

Minneapolis Directory Company. 1896. *Davison's Minneapolis City Directory 1896*. Minneapolis Directory Company: Minneapolis, MN.

_____. 1900. *Davison's Minneapolis City Directory 1900*. Minneapolis Directory Company: Minneapolis, MN.

_____. 1912. *Davison's Minneapolis City Directory 1912*. Minneapolis Directory Company: Minneapolis, MN.

Minneapolis Journal. 1905, 8 April.

Minneapolis Tribune. 1904, 1 May.

Nock, F. S. 1907. “Motorboat Sterns and Stems” in *The Motor Boat*. Volume 5, Number 5: 13-17.

Popular Boating. 1965, January.

Shell Lake Boats, Inc. 1966. *Get the picture on Shell Lake for 1966!* Shell Lake Boats, Inc.: Shell Lake, WI.

_____. 1968. *’68 Shell Lake*. Shell Lake Boats, Inc.: Shell Lake, WI.

Ramaley Boat Company. 1913. *Ramaley Row Boats*. Ramaley Boat Company: Wayzata, MN.

Rhude, Andreas Jordahl. 2009. *“*Shell Lake*”* in *Classic Boating*. September/October: 14-18.

Rybczynski, Witold. 2000. *One Good Turn: A Natural History of the Screwdriver and the Screw*. Touchstone: New York, NY.

Rupp Manufacturing Inc. 1967. *For Winter Fun or Work: Go Sno-Sport*. Rupp Manufacturing Inc.: Mansfield, OH.

W. H. Mullins Company. 1916. *The Outboard Special*. NP: Salem, OH.

Wells, Tom. 1998. “Nail Chronology: The Use of Technological Derived Features” in *Historical Archaeology* (32)2: 78-99.